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AD-729 830

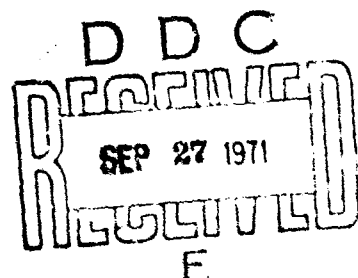
LASER HAZARDS & SAFETY

A DDC BIBLIOGRAPHY

December 1961 - May 1971

DDC-TAS-71-42

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AUGUST 1971

UNCLASSIFIED



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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT The references deal with the precautions employed, or suggested while working with, and administering laser equipment. Hazards to primates, and lower forms of life are discussed. Included are Corporate Author-Monitoring Agency, Subject, and Title indexes.		

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14. KEY WORDS	LINK A		LINK B		LINK C	
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*Laser Safety *Lasers *Bibliographies *Radiation Hazards Eye Retina Radiation Injuries Burns Thresholds (Physiology) Ophthalmology Safety						

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LASER HAZARDS & SAFETY

A DDC BIBLIOGRAPHY

December 1961 - May 1971

DDC-TAS-71-42

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August 1971

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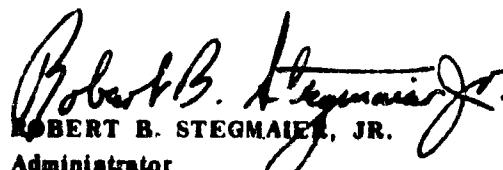
FOREWORD

This unclassified bibliography on *Laser Hazards and Safety* has been compiled from the Defense Documentation Center's data bank. The references cover the period of January 1962 through June 1971.

Included are Corporate Author-Monitoring Agency, Subject, and Title indexes.

BY ORDER OF THE DIRECTOR, DEFENSE SUPPLY AGENCY

OFFICIAL


ROBERT B. STEGMAIER, JR.
Administrator
Defense Documentation Center

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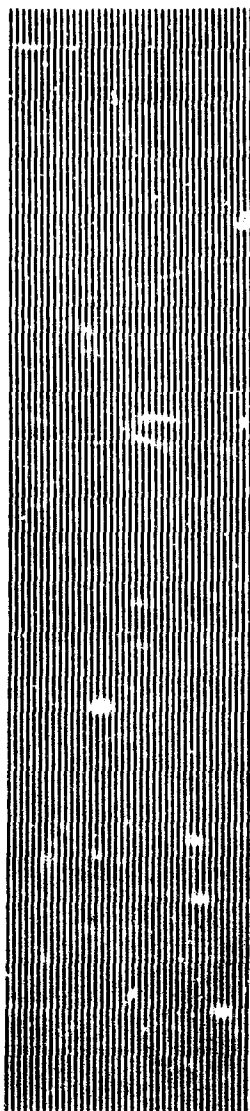
SUBJECT..... D-1

TITLE..... T-1

HOW TO ORDER BIBLIOGRAPHIC REPORTS.....(Inside back cover)

PARTIAL LIST OF *SCHEDULED BIBS*.....(Back cover)

The following is a selective list of titles of bibliographies related to this topic. Additional titles of other *scheduled bibs* also appear on the back cover.



- CANCER
- GALLIUM LASERS
- RADIATION CHEMISTRY
- RADIATION DAMAGE
- RADIATION HAZARDS

For more information on Scheduled Bibliographies, call 202-OX4-7207 or write to the Defense Documentation Center, ATTN: DDC-TAS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-264 393

NEW YORK UNIV N Y SCHOOL OF MEDICINE
PHOTOCOAGULATION PRODUCED BY A COHERENT LIGHT
SOURCE

(U)

DEC 61 IV ZARET, MILTON M. IBREININ, GOODWIN M.
CONTRACT: AF30 602 2215

UNCLASSIFIED REPORT

DESCRIPTORS: *EYE PIGMENTS, *LIGHT, *MASERS,
ELECTROMAGNETIC WAVES, EYE, HAZARDS, LASERS, PATHOLOGY,
WOUNDS + INJURIES (U)

ABIOTIC EFFECTS OF A PULSED BEAM OF LIGHT PRODUCED
BY A LASER (LIGHT AMPLIFICATION BY STIMULATED
EMISSION OF RADIATION) DEVICE WERE INVESTIGATED.
LASERS OR OPTICAL MASERS EMIT RADIOFREQUENCY
ELECTRO-MAGNETIC ENERGY HAVING MICROWAVE
CHARACTERISTICS. THE RETINA AND IRIS OF RABBITS
WERE EXPOSED TO SINGLE PULSES AND EXHIBITED
INSTANTANEOUS THERMAL LESIONS AFTER EACH EXPOSURE TO
THE COHERENT LIGHT SOURCE. POTENTIAL HAZARDS ARE
CONSIDERED IN THIS PRELIMINARY REPORT. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-485 847 6/18 6/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
RUBY LASER EFFECTS ON OCULAR STRUCTURES, (U)
JAN 66 10P JONES, ARTHUR E. ;
MCCARTNEY, ALAN J. ;
REPT. NO. USAMRL-653
PROJ: UA-3A014501A71E
TASK: 05

UNCLASSIFIED REPORT

DESCRIPTORS: (*EYE, RADIATION INJURIES), (*LASERS,
RADIATION INJURIES), CORNEA, LENSES, RETINA,
EYE PIGMENTS, PATHOLOGY, BURNS, HISTOLOGY,
OPHTHALMOLOGY, MEDICAL EQUIPMENT, RADIATION
HAZARDS, RUBY (U)

RUBY LASER EFFECTS ON OCULAR STRUCTURES.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-487 372 6/5
EDGEWOOD ARSENAL MD
EVALUATION OF THE MECHANISM OF SOME PHYSICAL EFFECTS
OF LASERS ON TISSUE. (U)
DESCRIPTIVE NOTE: TECHNICAL REPT. JUL 63-OCT 65;
AUG 66 41P MENDELSON, JANICE A. COOK,
NORMAN D. DEARMAN, JAMES R. ;
PROJ: DA-1M012501A077
MONITOR: EATR 4005

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, RADIATION INJURIES),
HAZARDS, HUMANS, RABBITS, WOUNDS + INJURIES,
PENETRATION, TISSUES(BIOLOGY), THERMAL
RADIATION, INTENSITY, FOCUSING (U)

THE PURPOSE OF THESE STUDIES WAS TO DETERMINE
WHETHER THERE IS ANY SIGNIFICANT HAZARD TO MAN
ACCIDENTALLY EXPOSED TO A LASER BEAM STRIKING
FLAT SURFACES OTHER THAN THE EYES. THIS WORK CONCERNS ACUTE
EFFECTS OF SURGICAL SIGNIFICANCE, WITHOUT
CONSIDERATION OF LONG-TERM EFFECTS. THE MAXIMUM
ENERGY DENSITY TESTED WAS ABOUT 7000 JOULES/2
MILLISECONDS IN A .48 CM SPOT SIZE, OBTAINED WITH A
NEODYMIUM-DOPED GLASS LASER ROD. A 'Q-SPOIL' LASER
DELIVERING ABOUT 3 JOULES WITH ABOUT 10,000,000 WATTS
MAXIMUM PEAK POWER WERE ALSO USED. BOTH 'THERMAL'
AND 'PRESSURE' EFFECTS WERE TESTED, THE FORMER BEING
MOST MARKED IN THE 'LONG-PULSE' MODE AND THE LATER IN
THE 'SHORT-PULSE' AS CAN BE PREDICTED FROM KNOWN
PHYSICAL PRINCIPLES. DESPITE INTENSE EFFECTS AT THE
POINT OF 'IMPACT,' ALL OF THESE ARE SO RAPIDLY
ATTENUATED ON PASSAGE THROUGH TISSUE THAT, EXCEPT
POSSIBLY IN THE EYE, NO SURGICALLY SIGNIFICANT DAMAGE
TO INTACT LARGE ANIMALS OR MAN SHOULD BE EXPECTED
FOLLOWING ACCIDENTAL EXPOSURE TO LASER.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-607 718

NAVAL TRAINING DEVICE CENTER PORT WASHINGTON N Y
BIOLOGICAL EFFECTS OF LASERS: SAFETY RECOMMENDATIONS
AND A COMMENT ON THE CONCEPT OF OCULAR DAMAGE. (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 64 15P CIRINCIONE, PAUL A. I
MONITOR: NAVTRADEVCE, THIS

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: THIS PAPER WAS PRESENTED AT THE
ANNUAL CONFERENCE ON THE BIOLOGIC EFFECTS OF LASER
RADIATION (1 ST), HELD AT THE ARMED FORCES
INSTITUTE OF PATHOLOGY, WALTER REED ARMY
HOSPITAL, WASHINGTON, D. C., 30 APR-1 MAY 64.

DESCRIPTORS: (*LASERS, BURNS), (*SAFETY, LASERS),
VISION, EYE, SAFETY, OPHTHALMOLOGY, BLINDNESS, RETINA,
TISSUES (BIOLOGY), NECROSIS, SKIN, PATHOLOGY, HUMANS,
EYEGLASSES (U)

THE BIOLOGICAL EFFECTS OF LASER RADIATION ARE
DISCUSSED WITH PARTICULAR EMPHASIS ON OCULAR DAMAGE.
SINCE LASERS ARE BEING EMPLOYED WITH INCREASING
FREQUENCY, AND SINCE A SAFETY HAZARD EXISTS, SPECIFIC
SAFETY RECOMMENDATIONS ARE MADE. A BEHAVIORAL
ASSESSMENT OF VISUAL IMPAIRMENT IN ADDITION TO
HISTOLOGICAL OR OPHTHALMOLOGICAL MEASUREMENT OF
DAMAGE IS DISCUSSED AND THE ADVANTAGES OF SUCH
ASSESSMENT DESCRIBED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-612 441

ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
ANATOMIC AND HISTOCHEMICAL CHANGES IN SKIN AFTER
LASER IRRADIATION.

(U)

63 9P HELWIG, ELSON B. JONES.
WALLACE A. THAYES, JUDE R. ZEITLER, ELMAR H.
;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN FEDERATION PROCEEDINGS
(U.S.) V24 N1 PT111 SUPP114 P583-591 JAN-FEB 1965
(COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE
CUSTOMERS).

DESCRIPTORS: (*PATHOLOGY, LASERS), (*LASERS, PATHOLOGY),
HISTOLOGICAL TECHNIQUES, SKIN, BURNS, CELLS (BIOLOGY),
WOUNDS AND INJURIES, ENZYMES, PROTEINS, SWINE (U)

THIS PRELIMINARY STUDY WAS DESIGNED TO EVALUATE THE
LASER-INDUCED ALTERATIONS OF STRUCTURE AND ENZYME
ACTIVITY IN THE MAMMALIAN SKIN AT DIFFERENT ENERGY
EXPOSURES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-614 442

ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
CENTRAL NERVOUS SYSTEM EFFECTS OF LASER RADIATION.

(U)

63 11P EARLE, KENNETH M. CARPENTER,
STIRLING IRUESSMANN, UROSIROSS, MARTIN A. I
HAYES, J. R. I

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN FEDERATION PROCEEDINGS
(U.S.) V24 N1 PTIII SUPP114 PS129-39 JAN-FEB 1965
(COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE
CUSTOMERS).

DESCRIPTORS: (*PATHOLOGY, LASERS), (*LASERS, PATHOLOGY),
(*BRAIN, WOUNDS AND INJURIES), CENTRAL NERVOUS SYSTEM,
HAIR, COLOR, HEAD, BURNS, HEMORRHAGE, SKIN, MICE, RATS,
MONKEYS (U)

EXPERIMENTS WERE CONDUCTED TO DETERMINE THE EFFECTS
OF FOCUSED AND UNFOCUSED LASER RADIATION UPON THE
SCALP, CRANIUM, AND BRAIN PARENCHYMA OF MICE AND
RATS. WITH AN UNFOCUSED BEAM, NO GROSS OR
MICROSCOPIC LESIONS OF THE BRAIN PARENCHYMA WERE
PRODUCED WHEN THE BEAM WAS DIRECTED ONTO THE INTACT
AND UNSHAVED SCALP AND CRANIUM, WITH A BEAM FOCUSED
ON THE UNSHAVED SCALP THE SKIN WAS BURNED, BUT THE
CRANIUM WAS INTACT. SUBDURAL, SUBARACHNOID, AND
FOCAL INTRACEREBRAL HEMORRHAGE WAS PRODUCED IN THE
BRAIN PARENCHYMA OF MICE BUT NOT OF RATS UNDER THESE
CONDITIONS. WHEN THE BEAM WAS AIMED ONTO THE HEAD
AND FOCUSED SO THAT THE FOCAL POINT WOULD BE INSIDE
THE CRANIUM AND WITHIN THE BRAIN PARENCHYMA ALONG A
TRACK THAT CORRESPONDED WITH THE FOCAL DEPTH, MOST OF
THE MICE DIED WITHIN MINUTES AFTER SUCH EXPERIMENTS
WHEN THE OUTPUT WAS ABOUT 20-40 JOULES. SIMILAR
LESIONS WERE PRODUCED IN RATS, BUT THE RATS WERE LESS
AFFECTED GENERALLY AND THE RESULTS WERE NOT
IMMEDIATELY FATAL. THE EXPERIMENTS SUGGEST THAT
THE HUMAN HAIR, SCALP, AND SKULL WOULD BE
SUFFICIENTLY THICK AND DENSE TO PROTECT THE BRAIN
FROM FOCUSED OR UNFOCUSED LASER RADIATION UP TO THE
40-JOULE OUTPUT AND PROBABLY MUCH HIGHER ENERGIES,
BUT THE BRAINS OF SMALL ANIMALS SUCH AS RATS AND MICE
CAN BE SEVERELY DAMAGED BY A FOCUSED BEAM THAT IS
PARTIALLY TRANSMITTED THROUGH THE SCALP AND SKULL.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-615 469

ZARET FOUNDATION INC SCARSDALE N Y

EFFECTS OF ELECTROMAGNETIC RADIATION ON BIOLOGICAL
SYSTEMS.

DESCRIPTIVE NOTE: ANNUAL PROGRESS REPT. FOR 15 JUN 64-1 (U)
APR 65.

APR 65 4P ZARET, MILTON M. :

CONTRACT: DA MD49 193 64G136

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: AVAILABLE ONLY FOR REFERENCE USE AT
DDC FIELD SERVICES. COPY IS NOT AVAILABLE FOR PUBLIC
SALE.

DESCRIPTORS: (*ELECTROMAGNETIC WAVES, RADIOBIOLOGY),
(*RADIOBIOLOGY, ELECTROMAGNETIC WAVES), (*LASERS,
RADIOBIOLOGY), RETINA, EYE, RABBITS, VISION, VISUAL
ACUITY, OPHTHALMOLOGY, ELECTROENCEPHALOGRAPHY, DAMAGE,
TISSUES (BIOLOGY), ADAPTATION (PHYSIOLOGY), NEODYMIUM,
ULTRAVIOLET RADIATION, FLUORESCENCE (U)

IDENTIFIERS: ELECTROPHYSIOLOGY,
ELECTRORETINOGRAPHY (U)

CONTENTS: NEODYMIUM LASER IRRADIATION OF RABBIT
EYE; EFFECTS OF LASER RADIATION ON VISUAL FUNCTION;
ELECTRORETINOGRAM AND CORTICAL EVOKED RESPONSE;
OCULAR FLUORESCENCE WITH ULTRAVIOLET LIGHT. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-617 913

AUTONETICS DOWNEY CALIF

OCCUPATIONAL LASER HAZARDS- A SURVEY OF THE
LITERATURE,

(U)

DESCRIPTIVE NOTE: REPT. FOR 1956-1965,

JUL 65 23P

KINNEY, MARNELE I

REPT. NO. TS-1245/3111

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY
LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF
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SALE.

DESCRIPTORS: (*LASERS, HAZARDS), (*BIBLIOGRAPHIES,
LASERS), SAFETY DEVICES, EYE, VISION, RETINA,
EYE GLASSES, PROTECTIVE CLOTHING, SKIN, BURNS,
TISSUES(BIOLOGY), PATHOLOGY, OPHTHALMOLOGY,
PHYSIOLOGY, INDUSTRIAL MEDICINE, INDEXES,
ABSTRACTING, REVIEWS

(U)

THE NEED FOR GUIDELINES TO PROTECT PERSONNEL
INVOLVED IN LASER RESEARCH IS GENERALLY RECOGNIZED.
THE LITERATURE REVEALS, HOWEVER, THAT VIEWS DIFFER
AS TO WHAT PRECAUTIONS SHOULD BE REQUIRED. THIS
BIBLIOGRAPHY CONTAINS 48 ENTRIES ARRANGED
ALPHABETICALLY BY AUTHOR, AND INCLUDES PAPERS
PUBLISHED IN THE OPEN LITERATURE AND REPORTS WHICH
MAY BE OBTAINED THROUGH THE DEFENSE DOCUMENTATION
CENTER. THE PERIOD OF TIME COVERED IS FROM 1956
THROUGH MAY 1965. (AUTHOR)

(U)

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AD-622 398

PHILCO NEWPORT BEACH CALIF AERONUTRONIC DIV

CHEMICALLY PUMPED LASER SYSTEM.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 25 JUN

64-31 JUL 65.

AUG 65 31P

BYRON, S. IKUBY, W. LAWRENCE, W.

FINIZIE, R. V. I

REPT. NO. U-3259

CONTRACT: DA36 034AMC0325T

PROJ: 1F5 23801D358

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, PUMPING(ELECTRONICS)),
(*PUMPING(ELECTRONICS), LASERS), (*ENERGY
CONVERSION, CHEMICAL REACTIONS), (*CHEMICAL
REACTIONS, PUMPING(ELECTRONICS)), PYROTECHNICS,
SHOCK TUBES, XENON, SHOCK WAVES, OPTICS, EYE,
MONEY, BURNS

(U)

IDENTIFIERS: CHEMICALLY PUMPED LASERS

(U)

A SUMMARY IS GIVEN OF THE STATE OF THE ART IN
CHEMICAL PUMPING OF LASERS. THE POTENTIAL PERFORMANCE
BY VARIOUS APPROACHES IS EVALUATED, AND THE SPECIFIC
APPROACH CHOSEN FOR FURTHER DEVELOPMENT UNDER THIS
CONTRACT IS DESCRIBED. THE PROGRAM PLAN FOR THE
REMAINDER OF THE CONTRACT IS OUTLINED AND PROGRESS
DURING THE PAST QUARTER IS DESCRIBED. DURING THIS
QUARTER AN EXPERIMENTAL EVALUATION OF VARIOUS
RADIATION COUPLING GEOMETRIES AND WINDOW MATERIALS
LED TO A SUCCESSFUL TEST IN WHICH LASER ACTION WAS
PRODUCED IN A RUBY BY SHOCK HEATED XENON. A
SUMMARY IS ALSO GIVEN OF EARLIER STUDIES BY THE
BIO-TECHNOLOGY DEPARTMENT OF THE PHILCO C
AND E DIVISION, BLUE BELL, PENNSYLVANIA,
WHICH WERE DIRECTED TOWARD MEASURING EYE DAMAGE IN
MONKEYS CAUSED BY LASER IRRADIATION. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-628 478 6/5
GEORGE WASHINGTON UNIV WASHINGTON D C
OBSERVATIONS ON EARLY PATHOLOGIC EFFECTS OF PHOTIC
INJURY TO THE RABBIT RETINA. A LIGHT AND ELECTRON
MICROSCOPIC STUDY. (U)
APR 65 23P FINE, BEN S. IGEERAETS, WALTER
J. i
CONTRACT: DA-49-193-MD-2680 , DA-49-146-XZ-102

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN ACTA OPHTHALMOLOGICA
V43 P684-91 1965. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH ARMED
FORCES INST. OF PATHOLOGY, WASHINGTON, D. C.
OPHTHALMIC BRANCH AND MEDICAL COLL. OF VIRGINIA.
DEPTS. OF OPHTHALMOLOGY AND BIOPHYSICS, RICHMOND.

DESCRIPTORS: (RETINA, PATHOLOGY), LIGHT, WOUNDS
+ INJURIES, XENON LAMPS, LASERS,
PHOTORECEPTORS, EYE, HAZARDS, RADIATION
INJURIES, ORGANIC PIGMENTS, TISSUES(BIOLOGY),
MICROSCOPY, ELECTRON MICROSCOPY,
THRESHOLDS(PHYSIOLOGY), MORPHOLOGY(BIOLOGY),
OPHTHALMOLOGY, RABBITS (U)

MILD RETINAL LESIONS, 5 HOURS OLD, PRODUCED BY A
PULSED XENONLAMP PHOTOCOAGULATOR AND BY A RUBY ROD
LASER WERE COMPARED BY LIGHT AND ELECTRON MICROSCOPY.
THE PHYSICAL PARAMETERS OF EXPOSURE TIME, DIAMETER
OF THE BEAM AT THE RETINAL PLANE, AND RETINAL DOSE
WERE VERY SIMILAR FOR BOTH METHODS. THE
OBSERVATIONS INDICATE THAT THE SITE OF EARLIEST
TISSUE CHANGE LIES WITHIN THE PIGMENT EPITHELIAL
CELL, MORE SPECIFICALLY IN THE FRAGILE SYSTEM OF
SMOOTH SURFACED ENDOPLASMIC RETICULUM OCCUPYING THE
APICAL AND MIDZONAL CYTOPLASM. IN MORE SEVERE
LESIONS, A NONSPECIFIC GRANULATION EFFECT WAS
OBSERVED IN THE PIGMENT EPITHELIUM AND PHOTORECEPTOR
CELLS ATTRIBUTED TO FOCAL DENSIFICATION OF CELL
MEMBRANES AND OF THE ADJACENT CYTOPLASMIC GROUND
SUBSTANCE. MORPHOLOGIC EVIDENCE IS PRESENTED
INDICATING ABSENCE OF TRANS-SYNAPTIC DEGENERATION
FROM THE PHOTORECEPTOR CELLS WITHIN THE LIMITED TIME
INTERVAL (5 HR.) OF THE EXPERIMENTS. THE
OBSERVATIONS ALSO SUPPORT THE BELIEF THAT THE
INTRACELLULAR CHANGES ARE NONSPECIFIC, VARYING ONLY
IN DEGREE OF SEVERITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-629 962 6/14 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
TPM-2: EFFECTS OF LASER IRRADIATION ON THE SKIN.

(U)

65 2P KUHNS, J. G. HELWIG, E. B. ;
STEIN, M. HAYES, J. R. ;

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN NEREM RECORD, A
DIGEST OF PAPERS PRESENTED AT THE NORTHEAST ELECTRONICS
RESEARCH AND ENGINEERING MEETING ON NOVEMBER 3, 4
AND 5, 1965. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE: ALSO INCLUDES BIOLOGICAL EFFECTS
OF LASER RADIATION II.

DESCRIPTORS: (*LASERS, RADIATION INJURIES),
(*RADIOBIOLOGY, LASERS), PATHOLOGY, SKIN,
BURNS, RUBY, DOSAGE, ORGANIC PIGMENTS,
ENZYMES, TEMPERATURE, TISSUES(BIOLOGY),
BIOPSY, HISTOLOGY, SWINE

(U)

EXPERIMENTS WERE CONTINUED TO EVALUATE THE EFFECTS
OF NON Q-SWITCHED RUBY LASER IRRADIATION ON SKIN.
INVESTIGATION WERE DIRECTED TOWARD ESTABLISHING
MINIMAL DOSES OF LASER IRRADIATION THAT PRODUCED
INJURY, EVALUATING THE EFFECT OF THE IRRADIATION ON
PIGMENTED VERSUS NON-PIGMENTED SKIN, CORRELATING THE
STRUCTURAL AND ENZYMATIC CHANGES WITH PREDICTED
TEMPERATURES OCCURRING IN THE SKIN AFTER A GIVEN DOSE,
AND UNDERSTANDING THE LESIONS IN TERMS OF THE
PHYSICAL CHARACTERISTICS OF THE BEAM.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-630 647 6/18 6/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
A CONSIDERATION OF THE BIOLOGICAL EFFECTS OF LASER.

(U)

65 15P MCCARTNEY, ALAN J. I
REPT. NO. USAMRL-654
PROJ: DA-3-A-014501-A-71-E

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN MILITARY MEDICINE V130
N11 P1069-77 NOV 1965. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (LASERS, PATHOLOGY), HEAD, EYE,
SKIN, CANCER, TISSUES(BIOLOGY), RADIATION
INJURIES, DAMAGE, RADIATION HAZARDS, TISSUE
CULTURE CELLS, ANIMALS, HUMANS, BIOPHYSICS,
THERAPY, OPHTHALMOLOGY, REVIEWS

(U)

THE PERTINENT WORK ON THE BIOLOGICAL EFFECTS OF
LASER IS REVIEWED. THE PHYSICAL PROPERTIES OF
LASER RADIATION ARE DESCRIBED AND A CORRELATION WITH
THESE PROPERTIES AND THE OBSERVED BIOLOGICAL EFFECTS
IS ATTEMPTED. THE BIOLOGICAL EFFECTS OF LASER ARE
DESCRIBED IN SOME DETAIL WITH REGARD TO: INTACT
ANIMALS; PRIMATE EYES; SKIN AND MALIGNANT TUMORS OF
ANIMAL AND HUMAN ORIGIN. LASER RADIATION IS
CAPABLE OF INFLECTING SEVERE DAMAGE ON THE
UNPROTECTED EYE. LASER APPEARS TO HAVE SOME
PROMISE IN SELECTED MEDICAL FIELDS SUCH AS CELLULAR
RESEARCH, CANCER THERAPY, AND OPHTHALMOLOGY.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-634 670 6/5 6/18
ARMY MISSILE COMMAND REDSTONE ARSENAL ALA
ELECTROMAGNETICS LAB
A LASER DEVICE FOR USE IN CLINICAL TREATMENT OF
MALIGNANT TUMORS. (U)
JUN 66 15P DEARMAN, JAMES R. ; MCKNIGHT,
W. B. ; HAKINS, R. W. 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE ARMY SCIENCE
CONFERENCE(1966), U. S. MILITARY ACADEMY, WEST
POINT, N. Y., 14-17 JUNE 1966. COMPLETE PROCEEDINGS
AVAILABLE IN TWO UNCLASSIFIED VOLUMES AS AD-634 615 AND
AD-634 616 AND ONE CLASSIFIED VOLUME AVAILABLE TO
QUALIFIED DDC USERS.

DESCRIPTORS: (CANCER, THERAPY), (LASERS,
SURGICAL TECHNIQUES), SKIN, BURNS,
MORPHOLOGY(BIOLOGY), PATHOLOGY, HISTOLOGY,
MEDICAL EQUIPMENT, MICE, RABBITS, MONKEYS (U)

A SERIES OF COOPERATIVE EXPERIMENTS BETWEEN THE
NATIONAL CANCER INSTITUTE AND THE ARMY
MISSILE COMMAND BEGAN IN LATE 1963 WITH TREATMENT
OF TWO SEPARATE TUMOR SYSTEMS IN TWO DIFFERENT
STRAINS OF MICE. THE FIRST GROUP CONSISTED OF 96
FEMALE C3DBA/F1 HYBRID MICE WITH A SINGLE
CLOUDMAN 591 MELANOMA IMPLANT IN EACH. FORTY-
FOUR OF THESE MICE WERE EXPOSED TO LASER RADIATION
AND FIFTY-TWO WERE UNTREATED AND USED FOR CONTROLS TO
DETERMINE THE DIFFERENCE IN SURVIVAL BETWEEN THE TWO
GROUPS. THE SECOND GROUP CONSISTED OF SEVENTY-
THREE FEMALE C57BL/6JN MICE WITH A SINGLE
LEWIS T241 SARCOMA IMPLANT IN EACH. THIRTY-
THREE OF THESE MICE HAD THE SARCOMA EXPOSED TO THE
LASER; FORTY WERE UNTREATED CONTROLS. THE RESULTS
OF THIS TEST ARE DISCUSSED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-634 917 19/5 20/5
KOLLSMAN INSTRUMENT CORP ELMHURST N Y
LASER APPLICATION AVIATION ORDNANCE STUDY. (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,
MAR 66 132P STEINHACKER, MARK I
CONTRACT: N61339-1867.
PROJ: 1867,
MONITOR: NAVTRADEVCE 1867-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, *GUNNERY TRAINERS), (*WEAPON
SYSTEMS, SIMULATION), NAVAL AIRCRAFT, ORDNANCE,
TRAINING DEVICES. SAFETY (U)

A LASER SYSTEM APPLICABLE TO A AIRBORNE AND GROUND
WEAPON SIMULATION TRAINING MISSIONS WAS DEVELOPED AND
DEMONSTRATED. A FULL RANGE WEAPON SIMULATION SYSTEM
WAS DESIGNED IN SUFFICIENT DETAIL TO ALLOW
FABRICATION OF A DEMONSTRATION SYSTEM. THE LASER
HEAD ASSEMBLY OF THIS SYSTEM, WHICH IS AN YTTRIUM
ALUMINUM GARNET (YAG) UNIT OPERATING AT 1.065
MICRONS AND TEN PULSES PER SECOND CONTINUOUS, WAS
SUBJECTED TO COMPLETE OPERATIONAL ENVIRONMENTAL
TESTS. IT WAS DEMONSTRATED TO BE CAPABLE OF
EXCEEDING THE REQUIREMENTS OF MIL-E-5400, MIL-
E-5272, MIL-STD-810 THE UNIT WAS SHOWN TO
OPERATE UNDER LONGITUDINAL SHOCKS OF 450 G'S. A
SELF-CONTAINED SILICON PHOTODETECTOR OPERATING AT
MAXIMUM RANGE SIGNAL LEVELS WAS USED TO MONITOR ALL
TESTS. EYE SAFETY WAS THOROUGHLY INVESTIGATED AND
SAFE OPERATIONAL PROCEDURES ARE GIVEN.
RECOMMENDATIONS FOR FUTURE LASER WEAPON SIMULATOR
EFFORT ARE INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-638 917 5/5
NEW YORK EYE AND EAR INFIRMARY N Y
INVESTIGATION OF THE EFFECTS OF RUBY LASER RADIATION
ON OCULAR TISSUE. (U)
JUN 66 34P JACOBSON, JERRY H. INAJAC,
HAROLD W. COOPER, BLOSSOM I
CONTRACT: DA-36-038-AMC-685(A),
PROJ: DA-0360,
MONITOR: FA R-1815

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LASERS, RETINA), (RETINA,
BURNS); EYE, CORNEA, RUBY, WOUNDS +
INJURIES, OPHTHALMOLOGY, THRESHOLDS (PHYSIOLOGY),
RABBITS, MATHEMATICAL ANALYSIS (U)

A SERIES OF LABORATORY AND FIELD EXPERIMENTS ON
RABBITS WERE CONDUCTED BY THE NEW YORK EYE AND
EAR INFIRMARY IN ORDER TO ESTABLISH TENTATIVE
SAFE OPERATIONAL DISTANCES AND CONDITIONS FOR USE OF
THE FRANKFORD ARSENAL XM23 LASER
RANGEFINDER. THE MEASURED FAR FIELD CORNEAL
THRESHOLD DOSE FOR RABBITS WAS TENTATIVELY DETERMINED
TO BE 5×10^{-7} TO THE MINUS 7TH POWER JOULE/SQ. CM.
FROM THIS A POSSIBLE HUMAN CORNEAL THRESHOLD WAS
CALCULATED AS 0.00000145 JOULE/SQ. CM. BASED ON
THIS VALUE, TENTATIVE SAFE OPERATIONAL DISTANCES WERE
CALCULATED AS BEING 6460 METERS FOR NIGHT (8 MM
PUPIL), 1815 METERS FOR TWILIGHT (4 MM PUPIL),
AND 914 METERS FOR DAYLIGHT (3 MM PUPIL).
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-644 756 6/5 6/18

GEORGETOWN UNIV WASHINGTON D C SCHOOL OF MEDICINE
CEREBRAL EDEMA AFTER LASER RADIATION. AN ELECTRON
MICROSCOPIC STUDY.

(U)

66 IIP LAMPERT, PETER W. IFOX, JOHN

L. IEARLE, KENNETH M. I

CONTRACT: DA-49-193-MD-2680

PROJ: DA-3 01240LA002

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF
NEUROPATHOLOGY AND EXPERIMENTAL NEUROLOGY V25 N4
P531-41 OCT 1966.

DESCRIPTORS: (*LASERS, PATHOLOGY), (*BRAIN,
EDEMA); ELECTRON MICROSCOPY; NECROSIS; TRACER
STUDIES; CEREBRAL CORTEX; BIOLOGICAL STAINS;
GLYCOGEN, RATS

(U)

CEREBRAL EDEMA WAS STUDIED WITH THE ELECTRON
MICROSCOPE IN RATS AROUND A FOCAL AREA OF CORTEXAL
NECROSIS PRODUCED BY LASER RADIATION. SWOLLEN
ASTROCYTIC PROCESSES WITHOUT MUCH ENLARGEMENT OF
INTERCELLULAR SPACES WERE OBSERVED IN THE EDEMATOUS
CORTEX. IN THE WHITE MATTER VERY WIDE
EXTRACELLULAR SPACES DEVELOPED. THOROTRAST, WHICH
WAS INJECTED INTRAVENOUSLY JUST PRIOR TO LASER
RADIATION, ESCAPED FROM DISRUPTED VESSELS IN THE
NECROTIC CENTER OF THE LESION BUT DID NOT TRAVERSE
VESSEL WALLS IN THE EDEMATOUS BRAIN. THOROTRAST
SPREAD FROM THE AREA OF NECROSIS INTO THE SURROUNDING
EDEMATOUS TISSUE. NARROW INTERCELLULAR SPACES IN
THE EDEMATOUS CORTEX LIMITED BUT DID NOT PREVENT THE
DIFFUSION OF THOROTRAST PARTICLES. GLYCOGEN
ACCUMULATED WITHIN ASTROCYTES IN THE EDEMATOUS
CORTEX, BUT NOT IN THE WHITE MATTER.

(AUTHOR)

(U)

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/ZZZZZ

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-645 452 6/18 6/5
EDGEWOOD ARSENAL MD
ABERRANT CORNEAL EPITHELIAL CELLS PRODUCED BY RUBY
LASER IRRADIATION. (U)
OCT 66 31P PARR, W. H. FISHER, ROBERT S.
;
PROJ: DA-3A014501871R
TASK: 01
MONITOR: USAMRL 698

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, WOUNDS + INJURIES),
(CORNEA, PATHOLOGY), CELL DIVISION, MITOSIS,
THERMAL RADIATION, HISTOLOGICAL TECHNIQUES,
SURGICAL TECHNIQUES, RATS, EYE, RADIATION
HAZARDS (U)

RAT CORNEAS WERE EXPOSED TO EITHER 4 JOULES PER SQ
CM OR 8 JOULES PER SQ CM AND WERE HARVESTED AT
VARYING TIMES FOLLOWING LASER EXPOSURE. CORNEAL
WHOLE MOUNTS WERE EVALUATED FOR CHANGES IN EITHER THE
DIFFERENTIAL MITOTIC CELL COUNT OR THE MITOTIC INDEX.
RUBY LASER RADIATION (6,943 A) PRODUCES
ABERRATIONS IN THE CORNEAL EPITHELIUM OF THE RAT.
AT 8 JOULES PER SQ CM BOTH INTERPHASE CELLS AND
CELLS IN ACTIVE MITOSIS WERE OBVIOUSLY ALTERED. AT
4 JOULES PER SQ CM ABERRANT CORNEAL EPITHELIAL CELLS
BECAME APPARENT IMMEDIATELY AFTER LASER IRRADIATION,
AND SOME WERE STILL PRESENT 30 DAYS LATER. THE
MECHANISM BY WHICH LASER RADIATION ALTERS THE CORNEA
REMAINS OBSCURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-645 608 6/5 6/18
NAVAL MEDICAL RESEARCH INST BETHESDA MD
DECREMENT IN VISUAL ACUITY FROM LASER LESIONS IN THE
FOVEA (U)
66 5P WOLBARSHT, MYRON L. I
MONITOR: NAVMED MRODS.13.1500.06

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN AEROSPACE MEDICINE V37
N12 P1250-2 DEC 1966.

DESCRIPTORS: (VISUAL ACUITY, DEGRADATION),
(RETINA, BURNS), (LASERS, BURNS), EYE,
PATHOLOGY, EYE PIGMENTS, EXPERIMENTAL DESIGN,
RUBY, NEODYMIUM, MONKEYS (U)

THE FUNCTIONAL LOSS FOLLOWING DESTRUCTION OF
SELECTED AREAS IN THE FOVEA OF STUMP-TAIL MACAQUE
MONKEYS WAS INVESTIGATED BY PSYCHOPHYSICAL METHODS.
THE LESIONS WERE PRODUCED BY RADIATION FROM RUBY
(6943 A) AND NEODYMIUM (10,600 A) LASERS IN
A NON-Q-SWITCHED MODE. THE RUBY LASER CAUSED
DESTRUCTION OF THE PIGMENT EPITHELIUM AND ASSOCIATED
STRUCTURES WHILE THE NEODYMIUM LASER HAD ITS MAIN
EFFECT IN THE NEURAL LAYERS OF THE RETINA. TOTAL
DESTRUCTION OF THE FOVEA REDUCES VISUAL ACUITY FROM
1.4 MIN. OF VISUAL ARC TO 9 MIN. OF ARC. THE LASER
PHOTOCOAGULATORS AND THE PSYCHOPHYSICAL EQUIPMENT ARE
PICTURED AND DESCRIBED. POSSIBLE FUTURE
EXPERIMENTS ARE DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-645 696 6/18 6/17 13/12
NAVAL APPLIED SCIENCE LAB BROOKLYN N Y
ELECTROMAGNETIC RADIATION HAZARDS IN THE NAVY. (U)
DESCRIPTIVE NOTE: TECHNICAL MEMO.,
JAN 67 26P CHRISTIANSON, C. ; RUTKOWSKI, A.

REPT. NO. NASL-TM-3
PROJ: NASL-9400-20 , SF013-15-04
TASK: 2162

UNCLASSIFIED REPORT

DESCRIPTORS: (•RADIATION HAZARDS, ELECTROMAGNETIC WAVES); NAVY, RADIOFREQUENCY, X RAYS, LASERS, PROTECTIVE CLOTHING, EYEGLASSES, SAFETY DEVICES, RADIATION MEASUREMENT SYSTEMS, RADIATION INJURIES (U)

THE MANY AND VARIED SOURCES OF ELECTROMAGNETIC HAZARDS IN TODAY'S MODERN NAVY ARE DESCRIBED IN THIS PAPER. HIGH POWER COMMUNICATION TRANSMITTERS, RADARS, LASERS AND RADAR POWER TUBES PRODUCE HAZARDS RANGING FROM HIGH VOLTAGE SHOCK TO IONIZING RADIATION. EFFECTS ON MAN ARE THERMAL (E.G. RETINAL AND SKIN BURNS) AND ATHERMAL (E.G. 'PEARL-CHAIN' FORMATION). BODY TISSUE ABSORPTION OF HF RADIATION, HEATING, TOLERANCE DOSAGE AND SAFETY LIMITS ARE DISCUSSED. SAFE DISTANCES FROM PRESENT NAVAL RADARS, AND FUTURE INCREASES IN RADAR POWER ARE INDICATED. CHARACTERISTICS OF PROTECTIVE DEVICES (RADAR SUIT, RADAR GOGGLES, HIGH VOLTAGE INSULATOR LINKS FOR SHIPS CRANES, X-RAY HAZARD METER) DEVELOPED AT NASL, ARE DESCRIBED. REMAINING PROBLEMS AND SOME UNUSUAL EFFECTS (•RF HEARING•) ARE MENTIONED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-646 009 13/12 20/5
NAVY UNDERWATER SOUND LAB NEW LONDON CONN
EXAMINATION OF SAFETY PROBLEMS ASSOCIATED WITH USL
FIELD LASER OPERATIONS. (U)
DESCRIPTIVE NOTE: RESEARCH REPT.,
NOV 66 27P POLLEY, RALPH J. ;
REPT. NO. USL-772
PROJ: SR-011-01-01-0401

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *SAFETY), EYE, BURNS,
RANGES(ESTABLISHMENTS), RETINA, RUBY (U)

THE REPORT DISCUSSES THE EYE SAFETY PROBLEM CREATED
BY PROJECTED FIELD OPERATIONS WITH A PULSED RUBY
LASER. INFORMATION IS PRESENTED TO (1) SUPPORT
THE ESTABLISHMENT OF 2×10 TO THE MINUS 9TH POWER
JOULES AS A CONSERVATIVE VALUE FOR THE AMOUNT OF
LASER ENERGY TOLERABLE AT THE EYE PUPIL, (2)
RELATE THIS THRESHOLD VALUE TO THE LASER BEAM
CHARACTERISTICS AND ATMOSPHERIC EFFECTS INVOLVED IN
THE USL EXPERIMENTS, AND (3) DESCRIBE THE
PARTICULAR RANGE GEOMETRY. FINALLY, PROCEDURES TO
ENSURE SAFE FIELD OPERATION ARE RECOMMENDED.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-647 643 6/18
GEORGE WASHINGTON UNIV WASHINGTON D C
CO2 LASER IRRADIATION OF THE RABBIT EYE. CLINICAL AND
HISTOPATHOLOGIC OBSERVATIONS, (U)
AUG 66 2P FINE, B. S. ; ZIMMERMAN, L.
E. ; FINE, S. ;
CONTRACT: DA-49-193-MD-2680, DA-49-193-MD-2436

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN NEREM RECORD P160-1
1966.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
NORTHEASTERN UNIV., BOSTON, MASS. RESEARCH
SUPPORTED IN PART BY PHS.

DESCRIPTORS: (LASERS, RADIOBIOLOGY), EYE,
PATHOLOGY, HISTOLOGY, HAZARDS, OPHTHALMOLOGY,
RETINA, WOUNDS + INJURIES, TISSUES(BIOLOGY),
THRESHOLDS(PHYSIOLOGY), CORNEA, HEALING,
RADIATION INJURIES (U)

THE CO2 LASER (10.6 MICRONS) OPERATING AT
HIGH-POWER LEVELS AND AT RELATIVELY HIGH EFFICIENCY
PRESENTS A MARKED HAZARD TO THE EXPOSED OCULAR AND
ADJACENT TISSUES. STUDIES WERE CARRIED OUT ON
RABBIT EYES TO EVALUATE THE SHORT- AND LONG-TERM
EFFECTS TO THE OCULAR MEDIA AT 10.6 MICRONS. THESE
WILL PROVIDE GUIDANCE NECESSARY FOR THE DEVELOPMENT
OF PROTECTIVE DEVICES, SAFETY CODES, AND FOR THE
MEDICAL MANAGEMENT OF ACCIDENTAL INJURY.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-648 204 6/18 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
SOME EFFECTS OF NEODYMIUM LASER RADIATION UPON THE
HEADS OF DOGS, (U)
67 7P EARLE, KENNETH M. IGARNER.
F. M. IKRANER, KEITH L. INCKNIGHT, WILLIAM
B. IDEARMAN, JAMES R. I

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN MILITARY MEDICINE V132
N2 P122-7 FEB 1967.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH AMC:
REDSTONE ARSENAL, ALA.

DESCRIPTORS: (*LASERS, WOUNDS + INJURIES),
(*RADIOBIOLOGY, LASERS), DOGS, HEAD,
NEODYMIUM, HISTOLOGICAL TECHNIQUES, PATHOLOGY (U)

FOUR BEAGLE CROSS DOGS WERE EXPOSED TO SINGLE
FOCUSED AND UNFOCUSED SHOTS OF NEODYMIUM LASER
RADIATION DIRECTED UPON THEIR SHAVED FOREHEADS.
THE ENERGY OF THE SHOTS ON TARGET WERE AS
FOLLOWS: (1) 610 JOULES UNFOCUSED OVER AN AREA
ABOUT ONE CM. IN DIAMETER, (2) 490 JOULES
FOCUSED OVER AN AREA ABOUT TWO MM. IN DIAMETER,
(3) 800 JOULES UNFOCUSED OVER AN AREA ABOUT ONE
CM. IN DIAMETER, (4) 610 JOULES FOCUSED OVER AN
AREA ABOUT TWO MM. IN DIAMETER. THE SEQUENCE OF
EVENTS WAS STUDIED BY HIGH SPEED MOVIES (UP TO 7000
FRAMES/SEC.), BY REGULAR SPEED MOVIES, AND BY
CLOSED CIRCUIT TELEVISION. ON TELEVISION THE HEADS
OF THE DOGS APPEARED TO MOVE AS A DIRECT RESULT OF
THE SHOT, BUT HIGH SPEED PHOTOGRAPHS REVEALED THAT
THE MOVEMENT CAME APPROXIMATELY 0.1 SECOND AFTER THE
SHOT. THE MOVEMENT OF THE HEAD CAME AFTER THE
BURNING OFF PERIOD HAD COMPLETELY CLEARED AND COULD
NOT HAVE BEEN DUE TO ANY EXPLOSIVE, ROCKET-LIKE, OR
OTHER PROPULSIVE EFFECT. THE TIME INTERVAL IS
COMPATIBLE WITH REACTION TO STARTLE OR PAIN. THE
DOGS APPEARED NORMAL AFTER THE SHOTS WITH NO EVIDENCE
OF CONCUSSION. TWO DOGS WERE OBSERVED FOR THREE
MONTHS AFTER THE SHOTS AND TWO DOGS WERE OBSERVED FOR
SIX MONTHS. AUTOPSY REVEALED SUPERFICIAL SCARRING
OF SKIN WITH FAILURE OF HAIR TO RE-GROW AT THE SITES
OF THE INITIAL BURNS. THE SKULL, DURA, AND BRAIN
OF EACH DOG SHOWED NO EVIDENCE OF DAMAGE FROM THE
LASER RADIATION ON GROSS OR MICROSCOPIC EXAMINATION.
(AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-652 707 6/18 6/10 6/5
ARMY ENVIRONMENTAL HYGIENE AGENCY EDGEWOOD ARSENAL MD
LASER HAZARDS BIBLIOGRAPHY, APRIL 1967. (U)
APR 67 25P SLINNEY, DAVID H. ; PALMISANO,
WILLIAM A. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, HAZARDS), BIBLIOGRAPHIES,
MEDICAL RESEARCH, SKIN, EYE, SAFETY DEVICES,
PROTECTION, COHERENT RADIATION, ATTENUATION,
PATHOLOGY, RADIATION HAZARDS, INDUSTRIAL MEDICINE (U)

THE BIBLIOGRAPHY PROVIDES A SOURCE OF REFERENCES
FOR THOSE INTERESTED IN THE BIOLOGICAL EFFECTS AND
THE EVALUATION OF HAZARDS ASSOCIATED WITH LASER
EQUIPMENT. THE REFERENCES ARE CATEGORIZED INTO SIX
PRINCIPAL SECTIONS: GENERAL INFORMATION;
BIOLOGICAL EFFECTS - GENERAL RESEARCH; SKIN
EFFECTS; EYE EFFECTS; SAFETY AND PROTECTIVE
EQUIPMENT AND PROCEDURES; AND ATMOSPHERIC
ATTENUATION OF LASER BEAMS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-652 792 6/18 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
THE EFFECTS OF LASER IRRADIATION ON THE CENTRAL
NERVOUS SYSTEM. 1. PRELIMINARY STUDIES. (U)
67 1UP HAYES, JUNE R. FOX, JOHN
L. ISTEIN, MARVIN N. I

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF
NEUROPATHOLOGY AND EXPERIMENTAL NEUROLOGY V26 N2
P250-8 APR 1967.

SUPPLEMENTARY NOTE: PREPARED FOR PRESENTATION IN PART AT
THE LASER MEDICAL RESEARCH FOUNDATION MEETING
(1ST), BOSTON JUN 3 17-18 1965, AND THE
INTERNATIONAL CONGRESS OF NEUROLOGICAL SURGERY
(3RD), COPENHAGEN, AUGUST 22-7 1965. PREPARED IN
COOPERATION WITH GEORGE WASHINGTON UNIV.,
WASHINGTON, D. C. SCHOOL OF MEDICINE, AND
VETERANS ADMINISTRATION HOSPITAL.

DESCRIPTORS: (*LASERS, *CENTRAL NERVOUS SYSTEM),
BRAIN, RADIATION EFFECTS, MORTALITY RATES, MICE,
PATHOLOGY, RADIATION HAZARDS, HISTOLOGY, TRACER
STUDIES, PERMEABILITY, GAS CHROMATOGRAPHY (U)

THE STUDY EXPLORED THE EFFECTS OF FOCUSED LASER
RADIATION ON THE BRAINS OF MICE, RATS, AND GUINEA
PIGS, BOTH WITH AND WITHOUT CRANIECTOMY. THE
REMOVAL OF THE INTERVENING SKULL BONE INCREASED THE
AMOUNT OF ENERGY ABSORBED BY THE BRAIN, BUT MARKEDLY
DECREASED THE MORTALITY RATE. AT SUFFICIENT
ENERGIES, ONE PULSE TRAIN OF LASER LIGHT FOCUSED ON
THE EXPOSED INTACT SKULL CAUSED FRACTURE OF THE SKULL
AND HERNIATION OF THE BRAIN THROUGH SUTURE LINES.
RESPIRATION CEASED IMMEDIATELY, AND CARDIAC
CONTRACTIONS STOPPED IN 12 TO 15 MINUTES.
COAGULATION, NECROSIS, AND HEMORRHAGE SURROUNDED BY
EDEMA WAS SEEN MICROSCOPICALLY AT THE SITE OF THE
LASER IRRADIATION. EXAMINATION OF THE BLOOD-BRAIN
BARRIER WITH A FLUORESCIN TRACER REVEALED INJURY AT
THE POINT OF LASER IMPACT AND ALSO ALONG THE BASAL
STRUCTURES OF THE BRAIN AND BRAIN STEM WHEN THE SKULL
BONE WAS NOT REMOVED. THIS INDICATED CAUDAL
HERNIATION OF THE TEMPORAL LOBE AND BRAIN STEM.
MAXIMUM DAMAGE OCCURRED IF THE FOCAL POINT OF THE
BEAM WAS ON THE SURFACE OF THE SKULL. HIGH-SPEED
CINEMATOGRAPHY VERIFIED THE OCCURRENCE OF EXPLOSIVE
PRESSURE CHANGES AS THE LASER ENERGY WAS ABSORBED
WITHIN THE CRANIAL CAVITY. GAS BUBBLES PRODUCED BY
LASER IRRADIATION CONTAINED OXYGEN, NITROGEN, AND
LIGHTER GASES OF AN UNDETERMINED NATURE.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-653 917 6/5
ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT
PARIS (FRANCE)
LOSS OF VISION FROM HIGH INTENSITY LIGHT. (U)
DESCRIPTIVE NOTE: CONFERENCE PROCEEDINGS.
66 193P
REPT. NO. AGARD-CP-11

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: NATO FURNISHED. A SYMPOSIUM
SPONSORED BY THE AEROSPACE MEDICAL PANEL OF AGARD-
NATO, HELD IN PARIS (FRANCE), 16-17 MAR 66.

DESCRIPTORS: (FLASHBLINDNESS, SYMPOSIA),
VISION, RETINA, BURNS,
THRESHOLDS(PHYSIOLOGY), LIGHT, INTENSITY,
LASERS, BLOOD VESSELS, HAZARDS, NUCLEAR
EXPLOSIONS, EYE, FLIGHT CREWS, SELECTION, VISUAL
ACUITY, PHOTOCHROMISM, NEUROMUSCULAR TRANSMISSION,
FRANCE (U)

CONTENTS: VISUAL DECREMENT IN HUMANS FOLLOWING
THERMONUCLEAR DETONATIONS; FUNCTIONAL DAMAGE
THRESHOLD FOR RETINAL BURN; VISUAL AND RETINAL
EFFECTS OF EXPOSURE TO HIGH INTENSITY LIGHT SOURCES;
IMMEDIATE AND DELAYED RETINAL VASCULAR CHANGES
FOLLOWING EXPOSURE TO HIGH INTENSITY LIGHT; EFFECTS
OF LASER IRRADIATION ON HEAD AND EYE OF SMALL ANIMALS
IN TERMS OF NEURO-MOTOR BEHAVIOR; THE TIME COURSE
OF FLASH-BLINDNESS; EFFECTS OF SIMULATED RETINAL
BURNS ON DETECTABILITY AND LEGIBILITY; PRESERVING
VISION DESPITE EXPOSURE TO HIGH INTENSITY LIGHT;
SUCCESS OF US NAVY EQUIPMENT DEVELOPMENT
PROGRAMS IN MEETING THE FLASH-BLINDNESS PROBLEM;
PHOTOCHROMIC SUBSTANCES; RELATIVE DANGER OF
RETINAL BURN AND FLASH-BLINDNESS FOR VARIOUS YIELDS
OF NUCLEAR EXPLOSIONS; PREDICTION OF EYE SAFE
SEPARATION DISTANCES; RESISTANCE TO FLASH-BLINDNESS
AND AIRCREW SELECTION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-654 523 6/18 6/10
ZARET FOUNDATION INC SCARSDALE N Y
OPHTHALMIC HAZARDS OF MICROWAVE AND LASER
ENVIRONMENTS. (U)
DESCRIPTIVE NOTE: ANNUAL PROGRESS REPT. 1 JUN 66-31
MAY 67,
MAY 67 12P ZARET, MILTON M. I
CONTRACT: DA-49-193-MD-2592

UNCLASSIFIED REPORT

DESCRIPTORS: (*MICROWAVES, RADIATION INJURIES),
(*LASERS, RADIATION INJURIES), (*RADIATION
INJURIES, *EYE), INDUSTRIAL MEDICINE, RADIATION
HAZARDS, TISSUES(BIOLOGY),
THRESHOLDS(PHYSIOLOGY), RETINA, PATHOLOGY,
OPHTHALMOLOGY (U)

THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE
THE NATURE AND SCOPE OF RADIATION HAZARDS AND TO
RECOMMEND THE REQUISITE PARAMETERS FOR HEALTH-SAFETY.
FOR BOTH MICROWAVE AND LASER RADIATION, OPHTHALMIC
PATHOLOGY IS THE MOST SENSITIVE INDICATOR OF INJURY.
THRESHOLD CHANGES ARE PRODUCED IN THE LENS WITH
MICROWAVE RADIATION AND IN THE RETINA WITH LASER
RADIATION. AS THE THRESHOLD LESIONS ARE NOT
OBVIOUS IN ROUTINE OPHTHALMIC EXAMINATION, SPECIAL
TECHNIQUES ARE UNDER DEVELOPMENT NOT ONLY TO PERMIT
DISCOVERY OF THE EARLIEST OCCURRENCE OF THE INJURY
BUT ALSO TO DOCUMENT THE FINDINGS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-657 88U 6/5 6/18
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
LASER INJURY IN SKIN. (U)
67 13P KUHN, JAMES G. HAYES, JUDE
STEIN, M. HELBIG, ELSON B. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN LABORATORY
INVESTIGATION V17 N1 P1-13 1967.

DESCRIPTORS: (*LASERS; *WOUNDS + INJURIES),
PATHOLOGY, SWINE, SKIN, ORGANIC PIGMENTS,
BURNS, PROTEINS, THERMAL RADIATION, ENZYMES,
TISSUES(BIOLOGY), BIOLOGICAL STAINS,
CONNECTIVE TISSUE, VAPORIZATION,
THRESHOLDS(PHYSIOLOGY) (U)

ACUTE LESIONS IN PORCINE SKIN PRODUCED BY NON-Q-SWITCHED RUBY LASER IRRADIATION WERE STUDIED GROSSLY AND BY MEANS OF A DISSECTING MICROSCOPE, HISTOLOGIC AND HISTOCHEMICAL TECHNIQUES, AND HIGH SPEED CINEMATOGRAPHY. THRESHOLD DOSES OF INJURY WERE ESTABLISHED IN PIGMENTED AND NONPIGMENTED PORCINE SKIN. THE LOWEST INCIDENT DOSE REQUIRED TO PRODUCE A MINIMAL LESION OF DESICCATION AND SCALING OF THE SUPERFICIAL EPIDERMIS WITH ERYTHEMA IN WHITE PIGS (IN SITU) WAS 40 JOULE'S EQUIVALENT PER SQ. CM. WITH A 2-MILLISECOND PULSE. A DOSE OF ONLY 2.2 JOULE'S EQUIVALENT PER SQ. CM. WAS REQUIRED TO PRODUCE A SIMILAR LESION IN BROWN SKIN. MORE SEVERE EFFECTS WERE OBSERVED IN AREAS WHERE THE OPTICAL ABSORPTION WAS GREATEST, SUCH AS IN THE PIGMENTED EPIDERMIS AND HAIR FOLLICLES AND INTRADERMALLY INJECTED PIGMENT. THESE FINDINGS ARE IN CONTRAST TO THOSE FOR BURNS FROM OTHER SOURCES. THE APPARENT SEQUENCE OF EVENTS OCCURRING IN A SEVERE LASER LESION IS THE FOLLOWING: (1) ABSORPTION OF THE RADIANT ENERGY AND CONVERSION TO HEAT, WITH LITTLE CONDUCTION TO ADJACENT TISSUE; (2) THERMAL DENATURATION OF TISSUE PROTEINS, AS EVIDENCED BY A LOSS OF ENZYME ACTIVITY AND ALTERATION IN CONNECTIVE TISSUE STAINING; (3) EXPLOSIVE VAPORIZATION OF TISSUE WATER; AND (4) HEATING OF TISSUE, WITH PRODUCTION OF GAS, CARBONIZATION, INCANDESCENCE, AND COMBUSTION. A RAPID, CONVENIENT TECHNIQUE IS DESCRIBED WHEREBY THE AREA OF ENZYME INACTIVATION FROM THERMAL DENATURATION IS CLEARLY DELINEATED IN FRESH GROSS TISSUE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-658 967 6/5 6/10 20/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
SURFACE TEMPERATURE AS A PARAMETER IN ESTIMATING
LASER INJURY THRESHOLDS. (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
JUN 67 32P PEACOCK, GEORGE R. ;
REPT. NO. USAMRL-733
PROJ: DA-3A014501B71K
TASK: 01

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *WOUNDS + INJURIES),
(*BURNS, PREDICTIONS); (*EYE, WOUNDS +
INJURIES); TISSUES(BIOLOGY); RETINA,
INFRARED RADIATION, THERMAL RADIATION, SURFACE
TEMPERATURES (U)

A SIMPLE MODEL BASED ON ELEVATION OF THE SURFACE
TEMPERATURE IN BIOLOGICAL TISSUE WAS FORMULATED IN AN
ATTEMPT TO AID IN ESTIMATING LASER INJURY THRESHOLDS.
THE MODEL SHOWS REASONABLE AGREEMENT IN THE RANGES
WHERE EXPERIMENTAL DATA ARE AVAILABLE. THIS FACT
LENS CONFIDENCE TO PREDICTIONS OF INJURY THRESHOLDS
FOR OTHER LASER WAVELENGTHS AND PULSE LENGTH.
PREDICTIONS ARE MADE IN PARTICULAR FOR EYE INJURY
IN THE VISIBLE AND NEAR INFRARED, FOR TISSUE BURNS IN
THE MID- AND FAR-INFRARED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-658 977 6/16
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
THIRST LEVEL DURING THE CONSUMPTION OF FLAVORED
WATER: EFFECTS ON SUBSEQUENT PREFERENCE. (U)
DESCRIPTIVE NOTE: PROGRESS REPT.,
AUG 67 11P REVUSKY, SAMUEL H. I
REPT. NO. USAMRL-748
PROJ: DA-3A014501871R
TASK: 3A014501871R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (=THIRST, TEST METHODS), WATER,
CONSUMPTION, TASTE, BEHAVIOR, MOTIVATION,
MEASUREMENT, LASERS, WOUNDS + INJURIES,
EDEMA (U)

CONCEIVABLY, THE EDEMA PRODUCED BY LASER
IRRADIATION MAY PRODUCE A STATE OF THIRST, BUT THERE
IS NO REASONABLE WAY TO TEST FOR THIS IN ANIMALS.
USUALLY THIRST IS DETECTED BY AN INCREASE IN THE
AMOUNT OF WATER REWARDED WORK AN ANIMAL WILL DO, BUT
THE LASER IRRADIATION ALSO SEEMS TO INTERFERE WITH
EFFECTIVE PERFORMANCE SO AS TO DROWN OUT ANY PRESUMED
INCREASED MOTIVATION FOR WATER. THUS, AN ATTEMPT
WAS MADE TO DISCOVER IF THIRST COULD BE DETECTED BY
SOME OTHER METHOD. RATS WERE ALLOWED TO DRINK
WATER OF ONE FLAVOR WHILE THIRSTY AND A SECOND FLAVOR
WHILE SATIATED FOR WATER. THEY THEN WERE GIVEN A
CHOICE BETWEEN THESE TWO FLAVORS. DURING THE
CHOICE TEST, THERE WAS AN INCREMENT IN THE PREFERENCE
FOR THE FLAVOR OF THE WATER WHICH WAS CONSUMED WHILE
THE RATS WERE THIRSTY. IT NOW IS POSSIBLE TO
EVALUATE WHETHER A STATE OF THIRST IS CREATED BY
LASER INJURY. (U)

UNCLASSIFIED

/ZZZZZ

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-659 128 6/18
GEORGE WASHINGTON UNIV WASHINGTON D C SCHOOL OF
MEDICINE
PRELIMINARY OBSERVATIONS ON OCULAR EFFECTS OF HIGH-
POWER, CONTINUOUS CO2 LASER IRRADIATION. (U)
67 14P FINE, BEN S. ; FINE, S. ;
PEACOCK, GEORGE H. ; GEERAETS, WALTER J. ; KLEIN,
EDMUND ;
CONTRACT: DA-49-193-MD-2680; DA-49-193-MD-2436

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN AMERICAN JOURNAL OF
OPHTHALMOLOGY V64 N2 P109-22 AUG 1967.

DESCRIPTORS: (*LASERS, *RADIATION INJURIES),
(*EYE, RADIATION INJURIES), RABBITS,
HISTOLOGICAL TECHNIQUES, OPHTHALMOLOGY, CARBON
DIOXIDE, BURNS (U)

THE VARIOUS OCULAR CHANGES THAT OCCUR IN
EXPERIMENTAL PIGMENTED RABBIT EYES SUBJECTED TO LASER
IRRADIATION AT 10.6 MICRONS WERE EVALUATED
CLINICALLY, GROSSLY AND HISTOPATHOLOGICALLY.
CORNEAL THICKENING AND CENTRAL CRATER FORMATION
OCCURRED THAT, AT HIGH-POWER LEVELS, PENETRATED INTO
THE ANTERIOR CHAMBER, ALONG WITH EJECTION OF AN
AQUEOUS STREAM. THICKENED CORNEA CONSISTED OF BOTH
"FUSED" AND NONFUSED LAMELLAE. SOME OF THE LESIONS
THAT DID NOT PENETRATE INTO THE EYE WERE ACCOMPANIED
BY A DEPRESSION OF THE ANTERIOR LENS SURFACE,
APPARENTLY A RESULT OF HEAT TRANSMISSION. DEEPER
INTRAOCULAR CHANGES DID NOT OCCUR IN THE
NONPENETRATED EYE WITHIN THE LIMITED TIME INTERVAL
BETWEEN IRRADIATION AND THESE PRELIMINARY
OBSERVATIONS. A FORM OF CORNEAL THICKENING HERE
TERMED "FUSION" OF CORNEAL LAMELLAE THAT OCCURRED AT
THE PERIPHERY OF THE CORNEAL LESION LOST AFFINITY FOR
ALCIAN BLUE, MASSON, AND VAN GIESON STAINS.
ELECTRON MICROSCOPY OF THIS REGION REVEALED
SCATTERED AMORPHOUS FOCI ALONG THE COLLAGEN FIBRILS
IN THE STROMAL LAMELLAE. A CLEAR PLASTIC FACE
SHIELD 0.060 INCHES THICK WAS FOUND TO BE AN
EFFECTIVE PROTECTION TO THE EYE UNDER THE LIMITED
CONDITIONS OF THESE EXPERIMENTS. THIS SHIELD MAY
ALSO SERVE AS AN INDICATOR OF ACCIDENTAL EXPOSURE.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-659 347 6/5 6/16 6/18
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
THRESHOLD LESIONS INDUCED IN PORCINE SKIN BY CO2
LASER RADIATION. (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
JUN 67 15P BROWNELL, ARNOLD S. IPARK,
WORDIE H. IMYSELL, DAVID K. IDEDRICK, ROBERT
S. I
REPT. NO. USAMRL-732
PROJ: DA-3-A-014501-B-71-R
TASK: 3-A-014501-B-71-R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (*BURNS, *LASERS),
THRESHOLDS(PHYSIOLOGY), RADIATION INJURIES,
SKIN, INFRARED RADIATION, CARBON DIOXIDE, SWINE (U)

THE SKIN OF WHITE PIGS WAS EXPOSED TO CO2 LASER
RADIATION WITH VARYING COMBINATIONS OF POWER DENSITY
AND EXPOSURE TIME. THE DOSE-RESPONSE RELATIONSHIP
FOR THRESHOLD BURNS HAS BEEN DETERMINED FOR POWER
DENSITIES WITHIN THE RANGE OF 1 TO 8 WATTS/SQ CM AND
EXPOSURE TIMES 0.4 TO 18 SEC. IN THE RANGE FROM
1.5 TO 8 WATTS/SQ CM THE DATA FIT THE EQUATION $H = 4.13 T$
TO THE MINUS .607 POWER WHERE H = INCIDENT
POWER DENSITY (WATTS/SQ CM) AND T = MEDIAN
EFFECTIVE EXPOSURE TIME (SEC). LIMITED DATA
SUGGEST THAT BELOW 1.5 WATTS/SQ CM THIS RELATIONSHIP
CHANGES. THE DATA PROVIDE INFORMATION FOR
ESTABLISHING SAFETY STANDARDS FOR CO2 LASER
RADIATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-660 361 6/18 6/5
NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
WASHINGTON D C DIV OF MEDICAL SCIENCES
HUMAN BIOLOGICAL INTERACTIONS WITH LASER LIGHT. (U)
DESCRIPTIVE NOTE: RESEARCH REPT.,
AUG 67 36P HUSTON, T. O. I
REPT. NO. NELC-1502
PROJ: SF-001-01-02
TASK: 11276

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, PATHOLOGY), EYE,
RETINA, CORNEA, BURNS, SKIN,
TISSUES(BIOLOGY), HAZARDS, GAS LASERS (U)

THE REPORT DISCUSSES THE EFFECT OF LASER LIGHT ON
THE HUMAN BODY, PARTICULARLY THE EYE. IT INCLUDES
CALCULATIONS OF THE RESULTS TO BE EXPECTED FOR SOME
COMMON COMMERCIAL GAS LASERS. EMPHASIS IS PLACED
UPON LOW POWER LASERS WHICH ARE THE MOST FREQUENTLY
MISHANDLED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-661 094 6/18 6/5
HONEYWELL INC ST PAUL MINN RESEARCH DEPT
LASER RADIATION EFFECTS ON THE MORPHOLOGY AND
FUNCTION OF OCULAR TISSUE. (U)
DESCRIPTIVE NOTE: ANNUAL REPT., NO. 1.
AUG 67 52P JONES, ARTHUR E.; FAIRCHILD.
DAVID D. I
REPT. NO. 12047-TDR1
CONTRACT: DADA17-67-C-0019

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, RADIOBIOLOGY); EYE,
TISSUES (BIOLOGY); RETINA; ELECTROPHYSIOLOGY,
PATHOLOGY; HISTOLOGY; ELECTRORETINOGRAPHY; NERVE
CELLS; BURNS; METABOLISM; AUTORADIOGRAPHY;
VISION; PHOTORECEPTORS; MATHEMATICAL ANALYSIS,
MONKEYS (U)

A STUDY WAS MADE OF THE EFFECTS OF LASER RADIATION
ON THE STRUCTURE AND FUNCTION OF THE PRIMATE RETINA.
THE PROGRAM ENCOMPASSES THE OCULAR EFFECTS OF
PULSED AND CW LASER RADIATION THROUGH: (1)
ANATOMICAL STUDIES OF LASER-EXPOSED AND NON-EXPOSED
TISSUE AT THE RESOLUTION OF BOTH LIGHT AND ELECTRON
OPTICS. THESE ARE DIRECTED TOWARD STUDIES OF THE
CHEMICAL MORPHOLOGY OF RETINAL STRUCTURES THROUGH
ENZYME AND OTHER STAINING TECHNIQUES. (2)
ANALYSIS OF BIOELECTRIC POTENTIALS IN THE VISUAL
SYSTEM. THE ELECTRORETINOGRAM RECORDED FROM THE
INTACT EYE IS USED TO FOLLOW LONG-TERM EFFECTS OF
LASER RADIATION. THE LERG (LOCALIZED
ELECTRORETINOGRAM) WILL BE USED TO STUDY LOCALIZED
EFFECTS OF LASER RADIATION. SINGLE UNIT RECORDING
FROM THE FOURTH-ORDER NEURONS (LGN) OF THE VISUAL
SYSTEM WILL BE USED TO STUDY PHOTOCHEMICAL EFFECTS OF
LASER RADIATION. (3) LASER-INDUCED CHANGES IN
RETINAL METABOLISM ARE BEING INVESTIGATED THROUGH
AUTORADIOGRAPHIC STUDIES OF C14 LABELED VITAMIN
A. (4) LASER EXPOSURES OF THE MACULA OF
RHESUS AND MANGABEY MONKEYS ARE MADE IN CONJUNCTION
WITH ERG STUDIES. THESE ANIMALS ARE TRAINED TO
PERFORM IN TESTING APPARATUS AND ARE TESTED FOR
VISUAL DEFECTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-664 15J 6/5 6/18
NAVAL MEDICAL RESEARCH INST BETHESDA MD
RETINA: PATHOLOGY OF NEODYMIUM AND RUBY LASER BURNS,
(U)
AUG 65 2P WOLBARSH, M. L. IFLIGSTEN,
K. E. HAYES, J. R. I
PROJ: NAVMED-MR005.13-1500.06
TASK: MR005.13-1500.06-3

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN SCIENCE V150 N3702 P1453-
4 DEC 10 1965.

DESCRIPTORS: (*BURNS, LASERS), (*RETINA,
PATHOLOGY), RUBY, NEODYMIUM, ABSORPTION, EYE
PIGMENTS, MONKEYS (U)

CHORIORETINAL LESIONS WERE PRODUCED IN MONKEYS
DURING EXPERIMENTS WITH RUBY AND NEODYMIUM LASERS.
MOST OF THE ENERGY FROM THE RUBY LASER
(WAVELENGTH 6943 ANGSTROMS) IS ABSORBED BY THE
PIGMENT EPITHELIUM, WHERE THE GREATEST DAMAGE
APPEARS. WITH THE NEODYMIUM LASER (10,600
ANGSTROMS) THE NEURAL PORTIONS OF THE RETINA ABSORB
MORE OF THE ENERGY THAN THE PIGMENT LAYER DOES!
CONSEQUENTLY THESE PORTIONS EXHIBIT MORE DAMAGE THAN
THE PIGMENT EPITHELIUM AND ADJACENT TISSUES.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-663 810 20/5

BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
ATMOSPHERIC EFFECTS ON THE BEAM PROPAGATION OF THE
XM-23 LASER RANGEFINDER.

DESCRIPTIVE NOTE: MEMORANDUM REPT.,

(U)

SEP 67 37P DEITZ, PAUL H. I

REPT. NO. BRL-MR-1871

PROJ: RDT/E-1WS23801A291

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE 'LASER RANGE
INSTRUMENTATION SEMINAR-IN-DEPTH' SPONSORED BY THE
SOCIETY OF PHOTOGRAPHIC INSTRUMENTATION ENGINEERS
HELD IN EL PASO, TEX., 16-17 OCT 1967.

DESCRIPTORS: (LASERS, RANGE FINDING), ENERGY,
SCINTILLATION, ATMOSPHERIC MOTION, DISTRIBUTION,
MEASUREMENT, DENSITY, PHOTOGRAPHIC IMAGES,
DENSITOMETERS, PREDICTIONS, HAZARDS, EYE,
THEORY, PROPAGATION

(U)

A SPECIAL OPTICAL RECEIVER WITH A 2-FOOT INPUT
APERTURE WAS USED TO MEASURE BEAM CROSS SECTIONS OF
THE XM-23 LASER RANGEFINDER. THE STANDARD
DEVIATIONS OF THE RECEIVED ENERGIES WERE DETERMINED
FOR PATHLENGTHS FROM 200 TO 1500 METERS. THE INDEX
STRUCTURE CONSTANT, C SUB N (DERIVED FROM THE
MEASURED THERMAL STRUCTURE FUNCTION) AND THE
SOLUTION TO THE SPHERICAL WAVE EQUATION WERE USED TO
PREDICT THE STANDARD DEVIATIONS OF THE OPTICAL ENERGY
DISTRIBUTIONS. THE PREDICTIONS BASED ON
METEOROLOGICAL MEASUREMENTS WERE COMPARED TO THE
STANDARD DEVIATIONS OF THE OPTICAL MEASUREMENTS FOR
HIGH SCINTILLATION CONDITIONS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-666 179 6/18 5/10
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
SOME EFFECTS OF RUBY LASER IRRADIATION ON RAT
PERFORMANCE. (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
NOV 67 29P REVUSKY, SAMUEL H. I
REPT. NO. USAMRL-759
PROJ: DA-3A014501871R
TASK: 1

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIOBIOLOGY, *LASERS), BEHAVIOR,
RADIATION INJURIES, ABDOMEN, DOSAGE,
THRESHOLD(S), PHYSIOLOGY, DEGRADATION,
PERFORMANCE TESTS, RATS (U)

A TOTAL DOSE OF 100 JOULES DELIVERED DURING 1.0 MS
AT A DENSITY OF 20 J/SQ CM ON THE MIDLINE OF THE
ABDOMEN DISRUPTED PERFORMANCE IN THE PRESENCE OF THE
REWARDED STIMULUS, BUT DID NOT APPEAR TO DISORGANIZE
THE ANIMALS; THAT IS, THE DISCRIMINATION BETWEEN THE
REWARDED STIMULUS AND THE NONREWARDED STIMULUS
REMAINED INTACT. THE EFFECT DISAPPEARED ON THE
THIRD DAY AFTER IRRADIATION. LOWER DOSES APPEARED
TO BE INEFFECTIVE. ALTHOUGH DIFFERENCES IN INDIVIDUAL
SUSCEPTIBILITY TO IRRADIATION PRECLUDE A DEFINITE
FINDING AT THIS POINT, A SIMILAR DOSE OF 200
JOULES TO THE HEAD APPEARED TO BE THE THRESHOLD FOR
PERFORMANCE DECHEMENT. THERE WAS SOME EVIDENCE
THAT HEAD INJURY COULD PRODUCE A LONGER LASTING
PERFORMANCE DECHEMENT AND COULD DISORGANIZE BEHAVIOR
IN A MANNER NOT OBTAINABLE WITH IRRADIATION OF THE
ABDOMEN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-667 494 6/18 6/10
ARMED FORCES-NRC COMMITTEE ON VISION WASHINGTON D C
LASER EYE EFFECTS. (U)
APR 68 94P SPERLING, H. G. ;
CONTRACT: NONR-2300(05)

UNCLASSIFIED REPORT

DESCRIPTORS: (•LASERS, RADIOBIOLOGY), (•EYE,
RADIATION INJURIES), RETINA, PROTECTION,
SAFETY DEVICES, EYEGLASSES, MEDICAL EXAMINATION,
INDUSTRIAL MEDICINE, RADIATION HAZARDS, SAFETY,
VISION, PATHOLOGY, OPHTHALMOLOGY, EYE PIGMENTS,
ABSORPTION(BIOLOGICAL), ELECTRON MICROSCOPY,
HISTOLOGY (U)

CONTENTS: A REVIEW OF TECHNICAL
CHARACTERISTICS OF LASERS; RETINAL INJURY FROM
LASER AND LIGHT EXPOSURE; LASER FUNCTIONAL EFFECT;
PERSONNEL PROTECTION FROM LASERS AND A DISCUSSION
OF EYE PROTECTIVE DEVICES; DEVICES FOR EYE
PROTECTION; EYE EXAMINATION STANDARDS AND
TREATMENT. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO /ZZZZ

AD-667 555 6/16 20/5

STANFORD RESEARCH INST MENLO PARK CALIF
INVESTIGATIONS OF LASER DAMAGE TO OCULAR
TISSUES.

(U)

DESCRIPTIVE NOTE: INTERIM REPT. 5 APR-31 AUG 67:
SEP 67 HUP VASSILIADIS, A. ; PEPPERS, N. ;
DEDMICK, K. ; CHANG, H. ; HONEY, R. C. ;
CONTRACT: F33615-67-C-1752
PROJ: SRI-6680

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIATION HAZARDS, LASERS),
(*DAMAGE ASSESSMENT, EYE), TISSUES(BIOLOGY),
RETINA, CORNEA, LABORATORY ANIMALS, MONKEYS,
RABBITS, NEODYMIUM, GAS LASERS,
THRESHOLD(PHYSIOLOGY), MATHEMATICAL MODELS,
HEAT TRANSFER, ONE-DIMENSIONAL FLOW, CORRELATION
TECHNIQUES, TEST METHODS, CONFIGURATION,
OPHTHALMOLOGY

(U)

IDENTIFIERS: LESIONS, *OCULAR TISSUES

(U)

PRELIMINARY RESULTS OF EXPERIMENTAL INVESTIGATIONS
OF MINIMALLY SIZED RETINAL LESIONS CAUSED BY
NEODYMIUM LASERS ARE PRESENTED. THE EXPERIMENTAL
ANIMALS WERE RHESUS MONKEYS. DATA FOR BOTH LONG-
PULSE NEODYMIUM AND Q-SWITCHED NEODYMIUM LASERS ARE
INCLUDED. RESULTS OF EXPERIMENTAL INVESTIGATION
FOR THRESHOLD DAMAGE BY A CW CO2 LASER TO RABBIT
CORNEAS ARE ALSO PRESENTED. DATA FOR TWO EXPOSURE
TIMES ARE INCLUDED. IN ADDITION, THEORETICAL
CALCULATIONS BASED ON A ONE-DIMENSIONAL HEAT-FLOW
MODEL ARE REPORTED, AND COMPARISON IS MADE WITH THE
EXPERIMENTAL RESULTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-668 906 6/18 20/5 9/2
PICATINNY ARSENAL DOVER N J F LTMAN RESEARCH LABS
A MODEL FOR THE STUDY OF RETINAL DAMAGE DUE TO LASER
RADIATION. (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 68 49P FAHS, JAMES H. I
PROJ: DA-17013001A91A
MONITOR: PA TR-3678

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, RADIATION INJURIES),
(RETINA, RADIATION INJURIES), MATHEMATICAL
MODELS, EYE PIGMENTS, THERMAL CONDUCTIVITY,
DIFFERENCE EQUATIONS, COMPUTER PROGRAMS,
MATHEMATICAL PREDICTION, PROGRAMMING LANGUAGES (U)
IDENTIFIERS: FORTRAN, COMPUTER ANALYSIS (U)

A MODEL IS PROPOSED FOR THE PREDICTION OF RETINAL
DAMAGE AS A RESULT OF LASER RADIATION STRIKING THE
EYE. THE DIFFERENTIAL EQUATION FOR HEAT
CONDUCTIVITY IS REPLACED BY A NUMERICAL DIFFERENCE
EQUATION AND A FORTRAN COMPUTER PROGRAM IS
PRESENTED WHICH WILL SOLVE THE EQUATION FOR GIVEN
INPUT. A SAMPLE CASE IS SHOWN AND PROGRAM LISTINGS
ARE GIVEN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-669 117 6/18 6/5
NAVAL SURMARINE MEDICAL CENTER GROTON CONN SURMARINE
MEDICAL RESEARCH LAB
LASER-INDUCED PATHOLOGY OF THE RABBIT RETINA:
COMPARISON OF THREE RADIATION WAVELENGTHS- (U)
DESCRIPTIVE NOTE: MEMORANDUM REPT.,
MAR 68 15P KENT, PAUL R. SPENCER,
JAMES A. E. SMITHWICK, GROVER A. I
REPT. NO. SMRL-MR-68-4
PROJ: NAVMED-MF022.03-08-9001
TASK: MF022.03-08-9001.01

UNCLASSIFIED REPORT

DESCRIPTORS: (•LASERS, •RADIATION INJURIES),
RETINA; RADIOBIOLOGY, PATHOLOGY, NEODYMIUM,
RUBY, HISTOLOGY, OPHTHALMOLOGY, BURNS (U)

SINCE LASER RADIATION CONSISTS OF ESSENTIALLY
PARALLEL RAYS, THE WAVELENGTHS TO WHICH THE OPULAR
MEDIA IS RELATIVELY TRANSPARENT ARE FOCUSED BY THE
EYE AT OR NEAR THE FUNDUS, GREATLY CONCENTRATING THE
ENERGY IN THE PROCESS. BECAUSE RETINAL DAMAGE CAN
RESULT, THE DIFFERENTIAL EFFECTS IN TERMS OF
WAVELENGTH AND POWER LEVELS IS OF CONSIDERABLE
IMPORTANCE. IN THIS STUDY DAMAGE TO THE RABBIT
RETINA WAS INDUCED BY IRRADIATION WITH NEODYMIUM,
RUBY, AND FREQUENCY-DOUBLED NEODYMIUM LASERS. THE
NEODYMIUM LASER (WAVELENGTH 10,600 ANGSTROMS)
PRODUCED THE SMALLEST LESIONS AND LEAST DAMAGE.
THE RUBY (6943 A) AND FREQUENCY-DOUBLED
NEODYMIUM (5300 A) LASERS CAUSED LESIONS SIMILAR
IN SIZE AND SEVEN DAY POST-IRRADIATION HISTO-
PATHOLOGY, EXCEPT FOR INTER-LAYER ADHESION
DIFFERENCES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-669 610 6/5 6/18
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
CO2 LASER INDUCED SKIN LESIONS. (U)
DESCRIPTIVE NOTE: FINAL REPT.,
MAR 68 25P BROWNELL, ARNOLD S. PARR,
WORDIE H. THYSELL, DAVID R. IDEDRICK, ROBERT
S. I
REPT. NO. USAMRL-769
PROJ: DA-3A014501B71K
TASK: 3A014501B71R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *BURNS), RADIATION
INJURIES, PATHOLOGY, SKIN, EXPOSURE, DOSAGE,
CARBON DIOXIDE, MATHEMATICAL MODELS, TABLES (U)

DEPILATED SKIN OF WHITE PIGS WAS EXPOSED TO
DIFFERENT EXPOSURE TIME-IRRADIANCE COMBINATIONS USING
CO2 LASER RADIATION (10.6 MICRONS). THE
LESIONS PRODUCED RANGED FROM A MILD ERYTHEMA TO
PARTIAL TISSUE COAGULATION. THE PROBABILITY OF
PRODUCING A PARTICULAR GRADE OF LESION WAS THEN
ESTABLISHED FOR POWER DENSITIES WITHIN THE RANGE OF
0.67-13.6 WATTS/SQ. CM AND EXPOSURE TIMES OF 0.2 TO
40 SEC. DATA OBTAINED ARE ADEQUATE TO ESTABLISH
LASER SAFETY STANDARDS. A RELATIVELY SIMPLE MODEL
IS DISCUSSED THAT DESCRIBES THE EXPOSURE PARAMETERS
TO PRODUCE THRESHOLD SKIN LESIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-670 852 6/5 6/18
STANFORD RESEARCH INST MENLO PARK CALIF
INVESTIGATIONS OF LASER DAMAGE TO OCULAR
TISSUES. (U)
DESCRIPTIVE NOTE: FINAL REPT. 5 APR 67-5 FEB 68
MAR 68 98P VASSILIADIS, A. IHONEY, R.
C. IPEPPERS, N. A. IZWENG, H. C. IROSAN, R.
C. I
CONTRACT: F33615-67-C-1752
PROJ: AF-6301, SRI-66801
TASK: 630105

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *BURNS), (*EYE,
RADIATION INJURIES), THRESHOLDS (PHYSIOLOGY),
PATHOLOGY, RETINA, REFLECTOMETERS, RUBY,
NEODYMIUM, CARBON DIOXIDE, OPHTHALMOLOGY (U)

RESULTS OF EXPERIMENTAL INVESTIGATIONS TO DETERMINE
THRESHOLD LEVELS FOR MINIMALLY-SIZED RETINAL LESIONS
CAUSED BY NEODYMIUM LONG-PULSED AND Q-SWITCHED
LASERS ARE PRESENTED. THE EXPERIMENTAL ANIMALS
WERE RHESUS MONKEYS. IN ADDITION, RESULTS OF
RETINAL DAMAGE DUE TO Q-SWITCHED RUBY, NEODYMIUM,
AND DOUBLED NEODYMIUM LASERS AT SUPRATHRESHOLD ENERGY
LEVELS ARE ALSO PRESENTED. A REPORT ON
HISTOPATHOLOGY OF RETINAL INJURY CAUSED BY Q-
SWITCHED LASERS IS PRESENTED. OBSERVATIONS ON
DAMAGE DUE TO BOTH RUBY AND NEODYMIUM LASERS ARE
DISCUSSED. THE DESIGN AND CONSTRUCTION OF A FUNDUS
REFLECTOMETER IS DESCRIBED, AND PRELIMINARY
MEASUREMENTS OF FUNDUS REFLECTANCE OF RABBIT, RHESUS
MONKEY, AND HUMAN SUBJECTS ARE REPORTED. RESULTS
OF AN EXPERIMENTAL INVESTIGATION TO DETERMINE
THRESHOLD DAMAGE LEVELS FOR A CO2 LASER TO RABBIT
CORNEAS ARE GIVEN. DATA FOR THREE EXPOSURE TIMES
ARE INCLUDED. IN ADDITION, THEORETICAL
CALCULATIONS BASED ON A ONE-DIMENSIONAL HEAT-FLOW
MODEL ARE REPORTED, AND COMPARISON IS MADE WITH THE
EXPERIMENTAL RESULTS. FINALLY, SOME RESULTS ON
PERMANENT CORNEAL DAMAGE DUE TO CO2 LASER ARE
REPORTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-670 864 6/5 6/18
PASADENA FOUNDATION FOR MEDICAL RESEARCH CALIF LASER
BIOLOGY LAB
EFFECT OF RUBY LASER ENERGY ON THE HUMAN IRIS. (U)
DESCRIPTIVE NOTE: REPT. FOR FEB-NOV 67,
MAR 68 13P ROUNDS, DONALD E. TOLSON,
ROBERT S. IRVINE, A. RAY, JR.
CONTRACT: F41609-67-C-0022
PROJ: AF-7753
TASK: 775301
MONITOR: SAM TR-68-34

UNCLASSIFIED REPORT

DESCRIPTORS: (•LASERS, •BURNS), (•EYE,
RADIATION INJURIES), RUBY, PHOTONS, PATHOLOGY,
THRESHOLDS (PHYSIOLOGY), OPHTHALMOLOGY (U)

EXCISED RINGS OF IRIDIAL SPHINCTER MUSCLE TAKEN
FROM RECENTLY ENUCLEATED HUMAN EYES WERE MONITORED
FOR THEIR CONTRACTILE AND TEARING RESPONSE AFTER
TREATMENT WITH VARYING PHOTON DENSITIES FROM A PULSED
RUBY LASER. THE RESPONSE WAS LINEAR BETWEEN 0 TO
26 J/SQ CM. BUT VARIABLE ABOVE THAT ENERGY DENSITY
LEVEL. A COMPARISON OF THIS RESPONSE WITH THAT OF
RINGS OF HAMSTER DORSAL AORTA SUGGESTED THAT THE
VARIABILITY WAS DUE TO IRIDIAL TISSUE DAMAGE. THIS
HYPOTHESIS WAS SUPPORTED WITH OBSERVATIONS THAT THE
IRIS SHOWED VARIABLE DEGREES OF DESTRUCTION AFTER THE
SECTIONING OF INTACT EYES EXPOSED TO A LASER DOSE
RANGE BETWEEN 28 AND 2200 J/SQ CM. THESE METHODS
SUGGESTED THAT THE THRESHOLD OF RUBY LASER ENERGY
WHICH WOULD IMPAIR THE FUNCTIONAL ACTIVITY OF THE
IRIS WAS APPROXIMATELY TEN TIMES THE DAMAGE THRESHOLD
LEVEL FOR THE HUMAN RETINA. ADDITIONAL WORK WAS
CALLED FOR TO EVALUATE THE EFFECT OF IRIDIAL DAMAGE
ON VISUAL ACUITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-671 866 20/5
NAVAL ORDANCE LAB WHITE OAK MD
TRAVEL REPORT ON THE FIRST INTERNATIONAL CONFERENCE
ON LASER APPLICATIONS - PARIS, FRANCE 18-23 JULY 1967
HELD AT SALLE DU ROND - POINT DES CHAMPS - ELYSEES IN
THE PALAIS DE GLACE, (U)
APR 68 31P MAXWELL, LOUIS R. I
REPT. NO. NOLTR-68-53

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, SYMPOSIA), RETINA,
HAZARDS, NEOPLASMS, MEASUREMENT,
INTERFEROMETERS, RANGE FINDING, MOON, PLASMA
PHYSICS, POSITIONING DEVICES(MACHINERY),
ALIGNMENT, REFRACTIVE INDEX, WELDING, FRANCE (U)

THE FIRST INTERNATIONAL CONFERENCE ON LASER
APPLICATIONS RESULTED IN THE PRESENTATION OF WORK
COVERING VERY WIDE AND DIVERSE SUBJECTS, INCLUDING
MEDICAL APPLICATIONS. SOME OF THE HIGHLIGHTS
REVIEWED IN THIS REPORT DEAL WITH MECHANICAL
ALIGNMENT INCLUDING SHOP PRACTICE, AIR TO GROUND
RANGE FINDING, TESTING OF MATERIALS, STUDY OF SHOCK
FRONTS AND CORRECTING TUMOR SITES ON EYE RETINAS.
A PROMISING APPLICATION PRESENTED IS WELDING OF
OXIDIZING METALS IN AIR. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-671 993 6/18 20/5
AIR PROVING GROUND CENTER EGLIN AFB FLA
HUMAN FACTORS/BIO MEDICAL SAFETY CONSIDERATIONS FOR
NEODYMIUM LASERS. (U)
DESCRIPTIVE NOTE: FINAL REPT.,
JUN 68 26P DURHAM, CHARLES V. ;
REPT. NO. APGC-TR-68-53
PROJ: AF-3169Y1

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, RADIOBIOLOGY),
BEAMS(ELECTROMAGNETIC), NEODYMIUM, OPERATION,
INSTRUCTION MANUALS, HAZARDS, SAFETY, HUMAN
ENGINEERING, PHYSIOLOGY, BURNS,
TOLERANCES(PHYSIOLOGY) (U)
IDENTIFIERS: *HUMAN FACTORS (U)

THIS GUIDE WAS DEVELOPED AS AN AID TO PERSONNEL
USING NEODYMIUM LASER SYSTEMS. IT CONTAINS BOTH A
BRIEF DISCUSSION OF THE CHARACTERISTICS OF LASER
SYSTEMS IN GENERAL, AND A MORE DETAILED REVIEW OF THE
NEODYMIUM, DOPED LASER AND ASSOCIATED HAZARDS.
SPECIFIC RECOMMENDATIONS ARE MADE IN REGARD TO THE
SAFE OPERATION OF THE NEODYMIUM LASER DURING GROUND
AND AIRBORNE OPERATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-673 618 6/5
NAVAL MEDICAL RESEARCH INST BETHESDA MD
THERMAL MODEL FOR RETINAL DAMAGE INDUCED BY PULSED
LASERS. (U)
DESCRIPTIVE NOTE: MEDICAL RESEARCH INTERIM REPT.,
68 9P HAYES, JUDE R. ;
MONITOR: NAVMED MR005.04.0014-7

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN AEROSPACE MEDICINE, V39
P474-480 MAY 68.

DESCRIPTORS: (*BURNS, RETINA), (*LASERS,
BURNS), EYE PIGMENTS, MATHEMATICAL MODELS,
EXPOSURE, THERMAL STABILITY, OPTICAL PROPERTIES,
GRANULES, THERMAL CONDUCTIVITY,
MEMBRANES(BIOLOGY), CELL STRUCTURE,
THRESHOLDS(PHYSIOLOGY), ELECTRIC FIELDS,
BLACKBODY RADIATION (U)
IDENTIFIERS: MELANIN (U)

THE MODEL OF THE RETINA EMPLOYING THE THERMAL
ABSORPTION OF A SLAB OF THE PIGMENT EPITHELIUM LAYER
(ASSUMED TO BE HOMOGENEOUS) AS PROPOSED BY VOS
HAS BEEN EXAMINED IN DETAIL FOR BOTH LONG EXPOSURE
TIMES (FOR WHICH IT WAS DESIGNED) AND SHORT
EXPOSURE TIMES. THIS MODEL IS SUFFICIENT TO
EXPLAIN THE DAMAGE FROM LONG EXPOSURES BUT NOT SHORT
EXPOSURES. WE HAVE EXAMINED THE PHYSICAL
CHARACTERISTICS OF THE PIGMENT EPITHELIUM,
PARTICULARLY WITH RESPECT TO THE THERMAL STABILITY
AND OPTICAL PROPERTIES OF THE MELANIN GRANULES. A
NEW MODEL IS PROPOSED WHICH IS BASED ON ABSORPTION OF
THE INCIDENT ENERGY BY THE ONE MICRON DIAMETER
PIGMENT GRANULES AND THERMAL CONDUCTION FROM THEM TO
NEARBY ESSENTIAL RETINAL STRUCTURES SUCH AS THE
PIGMENT CELL MEMBRANE AND THE RECEPTOR CELL MYELOID
BODY AND OUTER SEGMENT. THE NEW MODEL EXPLAINS
BOTH LONG AND SHORT PULSE EFFECTS. SUCH NONLINEAR
EFFECTS AS IONIZATION FROM INTENSE ELECTRIC FIELD
GRADIENTS, HARMONIC GENERATION, BRILLOUIN
SCATTERING, SHOCK WAVES, AND RERADIATION BY BLACK
BODY EMISSION ARE SHOWN TO MAKE NEGLIGIBLE
CONTRIBUTION TO THE INITIAL TISSUE DAMAGE WHERE THE
LESION IS MINIMAL. SHORTER EVENT TIMES (10 TO
THE MINUS 12TH POWER SECONDS) WHICH ARE POSSIBLE
FROM MODE LOCKED LASER OPERATION MAY REQUIRE OTHER
MECHANISMS THAN POSTULATED BY THIS THEORY.
(AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-674 249 6/5

ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
OCULAR HAZARDS OF TRANSSCLERAL LASER RADIATION. I.
SPECTRAL REFLECTION AND TRANSMISSION OF THE SCLERA
CHOROID AND RETINA,

(U)

68 11P STEIN, MARVIN N. SMITH.

RICHARD S. I

PROJ: DA-3AG14501B71P

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN AMERICAN JNL. OF
OPHTHALMOLOGY, V66 N1 P21-31 JUL 68.

DESCRIPTORS: (LASERS, HAZARDS), (RETINA,
BURNS); DOSAGE, CORNEA, REFLECTION, LIGHT
TRANSMISSION, SPECTROPHOTOMETERS, MEASUREMENT,
HUMANS; RABBITS, ABSORPTION(BIOLOGICAL),
TABLES

(U)

THE WIDESPREAD USE OF HIGH INTENSITY LASER DEVICES
SUGGESTS THE POSSIBILITY OF OCULAR INJURY FROM A
LASER BEAM TRANSMITTED THROUGH THE SCLERA. USING
HUMAN AUTOPSY EYES AND PIGMENTED RABBIT EYES, THE
SPECTRAL REFLECTION AND TRANSMISSION CHARACTERISTICS
OF THE SCLERA, CHOROID, AND RETINA WERE MEASURED BY
MEANS OF A SPECTROPHOTOMETER. VALUES OBTAINED OVER
THE SPECTRAL RANGE FROM 500 TO 2,600 MILLIMICRONS
SHOWED LITTLE VARIATION AMONG DIFFERENT SPECIMENS.
MEASUREMENTS MADE IN HUMAN AND RABBIT EYES WERE
QUALITATIVELY AND QUANTITATIVELY SIMILAR. THE
RESULTS OBTAINED AT 694.3 AND 1,060 MILLIMICRONS WERE
CONFIRMED BY A SECOND METHOD, USING RUBY AND
NEODYMIUM LASERS AS THE RADIATION SOURCE.
(AUTHOR)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-674 748 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
CORNEAL INJURY THRESHOLD TO CARBON DIOXIDE LASER
IRRADIATION.
68 15P FINE, BEN S. ; FEIGEN, L. ;
MACKEN, D. ; FINE, S. ;

(U)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN AMERICAN JNL. OF
OPHTHALMOLOGY. V66 N1 P1-15 JUL 68.

DESCRIPTORS: (*CORNEA, BURNS), LASERS, CARBON
DIOXIDE, TOLERANCES (PHYSIOLOGY),
THRESHOLDS (PHYSIOLOGY), MORPHOLOGY (BIOLOGY),
RABBITS, EXPOSURE, MICROSCOPY, VISUAL
INSPECTION, HISTOLOGICAL TECHNIQUES,
CELLS (BIOLOGY), PATHOLOGY

(U)

RABBIT EYES IN VIVO WERE EXPOSED TO DESCENDING-
POWER LEVELS OF CONTINUOUS CO2 LASER IRRADIATION TO
DETERMINE A THRESHOLD FOR INJURY. IRRADIATION AT A
POWER DENSITY OF 0.1 W/SQ CM FOR 30 MINUTES WAS FOUND
TO BE NON-INJURIOUS TO THE RABBIT EYE BY CLINICAL AND
HISTOPATHOLOGIC EXAMINATIONS. MILD SUPRATHRESHOLD
INJURIES WERE EXAMINED TO EVALUATE CHANGES THAT MIGHT
OCCUR IN THE MOST SUPERFICIAL CORNEAL LAYERS AND TO
SERVE AS A GUIDELINE FOR IMPROVED HISTOPATHOLOGIC
EVALUATION OF THE THRESHOLD AND NEAR-THRESHOLD
INJURIES. A VARIETY OF MORPHOLOGIC CHANGES IN THE
CORNEAL EPITHELIUM EPITHELIAL BASEMENT MEMBRANE, AND
SUPERFICIAL STROMA IN SUPRATHRESHOLD AND NEAR-
THRESHOLD LESIONS ARE DESCRIBED AND DISCUSSED.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-675 476 6/5 6/16
HONEYWELL INC ST PAUL MINN RESEARCH DEPT
LASER RADIATION EFFECTS ON THE MORPHOLOGY AND
FUNCTION OF OCULAR TISSUE. (U)
DESCRIPTIVE NOTE: ANNUAL REPT. NO. 2. 1 AUG 67-31 JUL
68.
JUL 68 76P JONES, ARTHUR E. ; FAIRCHILD,
DAVID D. ; SPYROPOULOS, PERRY ;
REPT. NO. 12047-TDR2
CONTRACT: DADA17-67-C-0019

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, BURNS),
(*ELECTRORETINOGRAPHY, POWER SPECTRA), VISION,
FLASHBLINDNESS, TRANSFER FUNCTIONS, RETINA,
VITAMIN A, DEFICIENCY DISEASES, FREQUENCY,
LIGHT, INTENSITY, MONKEYS (U)

A POWER SPECTRAL ANALYSIS WAS PERFORMED ON AVERAGED
RESPONSES FOR A NUMBER OF WAVELENGTHS AND INTENSITIES
OF SPECTRAL LIGHT. AN AVERAGING COMPUTER WAS USED
TO AVERAGE AT LEAST 50 CONSECUTIVE RESPONSES AT EACH
WAVELENGTH AND INTENSITY. THE STUDIES INDICATE
THAT THE ERG HAS MORE THAN ONE GENERATOR AND THERE
IS NO EVIDENCE OF A SINGLE MECHANISM WITH A SIMPLE
LINEAR PHASE SHIFT. ENERGY IS DISTRIBUTED IN SEVERAL
FREQUENCY BANDS AND EACH BAND HAS A THRESHOLD. THE
POWER SPECTRUM CONTAINS DIFFERENT FREQUENCY BANDS AS
A FUNCTION OF WAVELENGTH, AND ANATOMICAL SUBSTRATES
HAVE A FREQUENCY FINGERPRINT, AND THE ERG MAY BE
USEFUL AS A DIAGNOSTIC TOOL TO ASSESS THE STATE OF
THE RETINA. THE ERG OF THE MANGABEY WAS FOUND TO
BE ALTERED BY A SINGLE LASER PULSE OF LOW ENERGY
DENSITY (0.2 J/SQ CM) WHICH IRRADIATED A LARGE
RETINAL AREA. ERG'S RECORDED SIX OR MORE DAYS
POST-EXPOSURE SHOWED A DEPRESSION OR ABSENCE OF THE
THIRD OSCILLATORY POTENTIAL. THE IMPLICIT TIME OF
THE B-WAVE WAS SIGNIFICANTLY SHORTEN ($P < 0.001$)
POST-EXPOSURE. REPLICATION OF THE STUDY WITH
TESTING AT 4-10 DAYS AND SIX MONTHS POST-EXPOSURE
REVEALED STATISTICALLY SIGNIFICANT POST-EXPOSURE
ERG CHANGES PERSISTING UP TO SIX MONTHS.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-675 477 6/5 6/16
HONEYWELL INC ST PAUL MINN RESEARCH DEPT
THE EFFECTS OF HIGH-INTENSITY RADIANT STIMULATION OF
VARYING WAVELENGTHS AND DURATIONS ON RETINAL
SENSITIVITY. (U)
DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 63-31 MAR 68,
JUL 68 39P SPERLING, HARRY G. JONES,
ARTHUR E. DOCKINS, W. S. J
REPT. NO. 1549-FR1
CONTRACT: DA-49-193-MD-2457

UNCLASSIFIED REPORT

DESCRIPTORS: (RETINA, SENSITIVITY), LASERS,
BURNS, VISION, FLASHBLINDNESS, COLOR VISION,
ADAPTATION(PHYSIOLOGY), LIGHT, INTENSITY,
PRIMATES (U)

THE EFFECTS OF INTENSE SPECTRAL LIGHT ON SPECTRAL
SENSITIVITY WERE INVESTIGATED. BOTH CONTINUOUS
ADAPTATION AND PULSED ADAPTATION WERE USED. IT WAS
FOUND THAT SPECTRAL ADAPTATION IN DISCRETE SPECTRAL
BAND WAS REDUCED BY INTENSE BLUE, GREEN, AND RED
ADAPTATION. A MODEL OF THE PRIMATE SPECTRAL
SENSITIVITY WAS DEVELOPED WHICH CAN BE USED TO
PREDICT THE EFFECTS OF LASER AND OTHER SPECTRAL
SOURCES ON RETINAL SENSITIVITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-675 803 6/5 20/5
BIORAD INC NEW HYDE PARK N Y
LASER PARAMETERS FOR HUMAN VIEWING. I. AN ANALYSIS
OF VIEWING DIRECT AND SCATTERED LASER RADIATION. (U)
DESCRIPTIVE NOTE: FINAL REPT. 22 MAR-30 DEC 67.
AUG 68 95P SOLON, LEONARD R. SIMS, S.
DONALD I
REPT. NO. BIORAD-102-1
CONTRACT: N61339-67-C-0096
MONITOR: NAVTRADEVEN 67-C-0096-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *RADIATION HAZARDS),
(EYE, SAFETY), RETINA, ENERGY, OPTICS,
CORNEA, REFLECTION, SCATTERING, INTENSITY,
RUBY, PATHOLOGY, MATHEMATICAL PREDICTION,
PROTECTION, MILITARY TRAINING,
THRESHOLDS(PHYSIOLOGY), HUMAN ENGINEERING,
DAMAGE ASSESSMENT (U)
IDENTIFIERS: IRRADIANCE, *Q-SWITCHED LASERS,
STILES-CRAWFORD EFFECT, WAVELENGTH (U)

A GENERAL ANALYSIS IS FURNISHED OF THE
PHYSIOLOGICAL OPTICS OF DIRECTLY TRANSMITTED,
REFLECTED, AND SCATTERED LASER RADIATION.
PARAMETERS DETERMINING THE RETINAL IRRADIANCE FOR
CONTINUOUS LASERS (OR RADIANT EXPOSURE FOR PULSED
SOURCES) ARE TREATED IN DETAIL. PARTICULAR
ATTENTION IS DIRECTED TO OPTIMIZATION OF LASER
SYSTEMS WHERE VISUAL OBSERVATION IS REQUIRED; OR CAN
OCCUR INADVERTENTLY. AMONG FACTORS CONSIDERED ARE
THE INFLUENCE OF AUXILIARY OPTICS, ENVIRONMENTAL
ILLUMINATION, AND THE STILES-CRAWFORD EFFECT.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-676 578 4/18 8/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
CORRELATION BETWEEN THE GROSS AND MICROSCOPIC
APPEARANCE OF CO2 LASER INDUCED PORCINE SKIN
BURNS. (U)
JUN 68 24P HYSSELL, DAVID K. ; BROWNELL,
ARNOLD S. I
REPT. NO. USAMRL-776
PROJ: DA-3-A-014501-B-71-R
TASK: 3-A-014501-B-71-R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *BURNS), SKIN,
TOLERANCES(PHYSIOLOGY), CARBON DIOXIDE,
TISSUES(BIOLOGY), BIOPSY, VISUAL INSPECTION,
INTENSITY, HISTOLOGY, DENSITY, PATHOLOGY (U)

THE SKIN OF WHITE PIGS EXPOSED TO CO2 LASER
RADIATION WAS BIOPSIED AND EXAMINED FOR HISTOLOGIC
EVIDENCE OF DAMAGE. AS THE BURNS INCREASED IN
SEVERITY MACROSCOPICALLY, THERE WAS A COMMENSURATE
INCREASE IN MICROSCOPIC EVIDENCE OF TISSUE DAMAGE.
LIMITED DATA SUGGESTS THAT EVEN THOUGH BURNS
PRESENT SIMILAR SURFACE APPEARANCES, THOSE PRODUCED
BY HIGH INTENSITY CO2 LASER POWER DENSITIES MIGHT
HAVE MORE ACTUAL TISSUE DAMAGE THAN THOSE PRODUCED BY
A LOWER POWER DENSITY. INSUFFICIENT DATA WAS
AVAILABLE TO DETERMINE IF THE DIFFERENCES WERE
SIGNIFICANT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-676 806 6/19 20/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
LASER PROPERTIES AND EYE HAZARDS. (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
MAY 68 28P PEACOCK, GEORGE R. IVAN NUS,
FREDERICK I
REPT. NO. USAMRL-776
PROJ: DA-3-A-014501-B-71-P
TASK: 3-A-014501-B-71-P-02

UNCLASSIFIED REPORT

DESCRIPTORS: (COHERENT RADIATION, HAZARDS),
(EYE, DAMAGE ASSESSMENT), LASERS, VISION,
WOUNDS + INJURIES, PROTECTION, SAFETY, MEDICAL
RESEARCH, THRESHOLDS (PHYSIOLOGY),
TOLERANCES (PHYSIOLOGY), OPTICAL PROPERTIES,
SPECTRA (INFRARED) (U)
IDENTIFIERS: WAVELENGTH, LESIONS (U)

EYE INJURY IS A RECOGNIZED HAZARD OF LASER
RADIATION. THIS REPORT INCLUDES A BASIC DISCUSSION
OF THOSE LASER OUTPUT PARAMETERS THAT ARE IMPORTANT
IN UNDERSTANDING LASERS AND HOW THEY ARE RELATED TO
LASER EYE INJURY. THE THREE MOST SIGNIFICANT
PROPERTIES OF LASER BEAMS IN THIS RESPECT ARE
WAVELENGTH, TIME CHARACTERISTICS AND BEAM GEOMETRY.
THE FIRST TWO DETERMINE THE SITE MOST SUSCEPTIBLE
TO INJURY AND ITS SENSITIVITY TO LASER EXPOSURE DOSE.
THE THIRD, BEAM GEOMETRY, ESSENTIALLY GOVERNS THE
DISTANCE AT WHICH A GIVEN LASER IS CAPABLE OF
PRODUCING A HAZARDOUS EXPOSURE CONDITION. A BRIEF
DESCRIPTION OF EXPERIMENTAL INJURY FINDINGS AND SOME
THRESHOLD EXPOSURE DOSES, AS REPORTED IN THE
LITERATURE, ARE SUMMARIZED. LASER SAFETY
CONSIDERATIONS ARE DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ

AD-A79 455 6/5 20/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
CORNEAL CALCIFICATION. (U)
AUG 68 2P FINE, BEN S. IBERKOW, JOSEPH
W. IFINE, SAMUEL I

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SCIENCE. V162 #129-130, 4
OCT 68.

DESCRIPTORS: (*LASERS, BURNS), (*CORNEA,
*BURNS), RABBITS, ELECTRON MICROSCOPY, CARBON
DIOXIDE, OPHTHALMOLOGY, PATHOLOGY, THERMAL
RADIATION (U)
IDENTIFIERS: CALCIFICATION (U)

SUPERFICIAL CALCIFICATION WAS PRODUCED IN THE
NORMAL RABBIT CORNEA BY MILD IRRADIATION WITH A
CARBON DIOXIDE LASER. THE CALCIFICATION WAS
ENTIRELY EXTRACELLULAR AND CLOSELY RESEMBLED THAT
OBSERVED IN HUMAN BAND KERATOPATHY, WHICH WAS
CHARACTERIZED AS HYDROXYAPATITE BY X-RAY DIFFRACTION.
THE ELECTRON-MICROSCOPIC APPEARANCE OF CALCIFIC
SPHERULES AND CONGLOMERATES IN EARLY CORNEAL
CALCIFICATION IS PRESENTED. THE CALCIFIC SPHERULES
ARISE AT THE BASAL PLASMA MEMBRANE SURFACE OF THE
EPITHELIAL CELLS IN CLOSE RELATION TO THEIR BASEMENT
MEMBRANE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-679 457 6/5 20/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
CELLULAR EFFECTS OF LASER RADIATION, (U)
FEB 68 17P FAITH, GLENN C. ISTEIN,
MARVIN N. IHAYES, JUDE R. ISTOWELL, ROBERT E.
1
PROJ: DA-3-A-014501-B-71-P
TASK: 3-A-014501-B-71-P-06

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN ARCHIVES OF PATHOLOGY, V86
P262-278 SEP 68.

SUPPLEMENTARY NOTE: PREPARED FOR PRESENTATION AT ANNUAL
MEETING OF THE FEDERATION OF AMERICAN SOCIETIES FOR
EXPERIMENTAL BIOLOGY (49TH), ATLANTIC CITY, N.
J., 10 APR 65.

DESCRIPTORS: (*LASERS, *BURNS), LIVER,
MICROSCOPY, THERMAL RADIATION, PROTEINS,
COAGULATION, OPHTHALMOLOGY, HISTOLOGICAL
TECHNIQUES, CYTOLOGY (U)
IDENTIFIERS: LESIONS, NECROSIS, LASER
NECROSIS (U)

BURSTS OF RUBY LASER ENERGY FROM 23 TO 135 JOULES/
SQ CM WERE DIRECTED AT THE EXPOSED LIVERS OF
ANESTHETIZED MICE. IMMEDIATELY, LIGHT GRAY LESIONS
APPEARED THAT EXTENDED HEMISPHERICALLY INTO THE
PARENCHYMA. AT HIGH ENERGIES, THERE WAS CAVITATION
AND EXTRUSION OF TISSUE. PORTIONS OF THE LESIONS
WERE FIXED, EMBEDDED IN PARAFFIN OR EPOXY RESIN, AND
EXAMINED MICROSCOPICALLY. CELLS WERE DISTORTED,
INTERCELLULAR SPACES WIDENED, AND STAINING PROPERTIES
ALTERED. NUCLEOPLASMIC CONSTITUENTS BECAME
AGGREGATED, AND CYTOPLASMIC COMPONENTS WERE OFTEN
MARKEDLY DISARRANGED. WITHIN THE PERSPECTIVE OF
THE LITERATURE ON PHOTIC, THERMAL, AND LASER INJURY,
IT IS CONCLUDED THAT A REASONABLE CONCEPT OF THE
PATHOGENESIS OF LASER-INDUCED NECROSIS IS ONE OF
HEAT-MEDIATED DENATURATION AND COAGULATION OF CELL
PROTEINS, AND VAPORIZATION OF TISSUE WATER, CREATING
MULTIPLE INTERCELLULAR AND INTRACELLULAR SPACES.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ

AD-680 915 6/5 6/18 20/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
CORNEAL INJURY PRODUCED BY CO2 LASER
RADIATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
AUG 68 40P LEIBOWITZ, HOWARD M. ;
PEACOCK, GEORGE R. ;
REPT. NO. USAMRL-787
PROJ: DA-3-A-014501-B-71-R
TASK: 3-A-014501-B-71-R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (CORNEA, WOUNDS + INJURIES),
(RADIATION EFFECTS, CORNEA); GAS LASERS,
INFRARED RADIATION, CARBON DIOXIDE, RABBITS,
DOSAGE, EXPOSURE, OPHTHALMOLOGY, PATHOLOGY,
TABLES, BURNS (U)

THE PATHOLOGICAL EFFECTS UPON THE EYE OF EXPOSURE
TO INFRARED LASER RADIATION, EMITTED BY A CO2
LASER, WAS STUDIED. A TOTAL OF 142 RABBIT EYES WAS
IRRADIATED AT VARYING DOSE LEVELS AND EACH WAS
OBSERVED FOR A PERIOD OF TWO MONTHS. WITHIN THE
LIMITS OF THE POWER OUTPUTS AND EXPOSURE TIMES
CONSIDERED, CLINICALLY DETECTABLE OCULAR DAMAGE WAS
LIMITED TO THE CORNEA. FIVE CLINICAL LEVELS OF
CORNEAL INJURY WERE DEFINED AND THE DOSAGE OF CO2
LASER RADIATION CAPABLE OF PRODUCING EACH LEVEL OF
INJURY WAS DETERMINED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /22222

AD-680 946 6/18 6/13
PASADENA FOUNDATION FOR MEDICAL RESEARCH CALIF DEPT OF
LASER BIOLOGY
THE EFFECT OF LASER ENERGY ON CELLS IN TISSUE
CULTURE. (U)
DESCRIPTIVE NOTE. ANNUAL SUMMARY REPT. NO. 1,
JAN 69 20P ROUNDS, DONALD E. ;
CONTRACT: DA-49-193-MD-2564

UNCLASSIFIED REPORT

DESCRIPTORS: (*TISSUE CULTURE CELLS, *LASERS),
ENERGY, BLOOD COAGULATION, GROWTH, STIMULATION,
MITOCHONDRIA, PHOTSENSITIVITY(BIOLOGICAL),
CHROMOSOMES, *DISEASES, PLASMODIUM, PATHOLOGY,
AGGLUTININS, MORPHOLOGY(BIOLOGY) (U)

RUBY LASER IRRADIATION CAUSES NONPIGMENTED CELLS TO
DEPOSIT AN AGENT INTO THE SURROUNDING CULTURE MEDIUM
WHICH CAN PROMOTE RBC AGGLUTINATION, BLOOD
CLOTTING, WBC CHEMOTAXIS AND STIMULATION OF CELL
GROWTH. BLUE AND GREEN LASER WAVELENGTHS PRODUCE
MITOCHONDRIAL SWELLING IN BEATING RAT HEART CELLS.
MORPHOLOGICAL CHANGES SUGGEST THAT A TOXIC
SUBSTANCE IS LOST FROM THESE STRUCTURES, WHICH
RESULTS IN NUCLEAR PYCNOSIS AND DEATH OF THE CELL.
A VARIETY OF DRUGS WERE OBSERVED TO PHOTSENSITIZE
INDIVIDUAL MITOCHONDRIA TO AN ARGON LASER MICROBEAM.
THESE INCLUDED VARIOUS FORMS OF TETRACYCLINE,
DNP, AMYTAL, AND NAF. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-681 899 6/5 20/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
LASER-INDUCED CATARACTOGENESIS: I. CLINICAL
AND ELECTROPHORETIC ALTERATIONS. (U)
DESCRIPTIVE NOTE: FINAL REPT.,
OCT 68 23P LUZZIO, ANTHONY J. I
LEIBOWITZ, HOWARD M. I
REPT. NO. USAMRL-795
PROJ: DA-3-A-061102-B-71-R
TASK: 3-A-061102-B-71-R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (•EYE; •INTEGUMENTARY DISEASES),
(•LASERS, HAZARDS); PROTEINS, MOBILITY,
ELECTROPHORESIS, RABBITS, RUBY, LIGHT PULSES,
HEATING (U)
IDENTIFIERS: •CATARACTS; LASER INJURIES (U)

IRRADIATED ANIMALS WERE FOLLOWED CLINICALLY BY
EXAMINATION WITH THE SLIT-LAMP BIOMICROSCOPE AND
INDIRECT OPHTHALMOSCOPE. LASER-INDUCED CATARACTS
WERE EXTRACTED USING A CRYOPROBE AND ELECTROPHORETIC
ANALYSIS PERFORMED ON THE LENS PROTEINS. THE
CLINICAL COURSE AND CHARACTERISTICS OF LASER-INDUCED
LENS OPACITIES AND OF THE ACCOMPANYING OPHTHALMIC
SEQUELAE ARE DESCRIBED. AN ALTERATION IN THE
ELECTROPHORETIC MOBILITY OF THE LENS PROTEINS OF
LASER-INDUCED CATARACTS IS PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-681 906 13/12 6/10 20/5
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
TWELVE EYE SAFETY NOMOGRAPHS. (U)
DESCRIPTIVE NOTE: TECHNICAL NOTE,
DEC 68 21P DEITZ, PAUL H. ;
REPT. NO. BRL-TN-1709
PROJ: RDT/E-1-T-061102-A-31-C

UNCLASSIFIED REPORT

DESCRIPTORS: (EYE, SAFETY), (SAFETY,
NOMOGRAPHS), (LASERS, HAZARDS), RETINA,
PROPAGATION, ATMOSPHERIC MOTION, ATTENUATION,
THRESHOLDS(PHYSIOLOGY), TABLES, WOUNDS +
INJURIES

IDENTIFIERS: LASER INJURIES

(U)
(U)

A SET OF NOMOGRAPHS IS GIVEN TO AID IN THE
DERIVATION OF PROBABILITY OF RETINAL DAMAGE BY A
PULSED LASER BEAM, AS A FUNCTION OF RANGE FOR
DIFFERENT CONDITIONS OF ATMOSPHERIC TURBULENCE AND
ATTENUATION. (AUTHOR

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD#681 907 20/5 13/13
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
BEAM PROFILE EFFECTS IN LASER SAFETY ANALYSIS. (U)
DESCRIPTIVE NOTE: TECHNICAL NOTE,
DEC 68 14P DEITZ, PAUL H. ; LIVINGSTON,
PETER M. ;
REPT. NO. BRL-TN-1710
PROJ: RDT/E-1-T-061102-A-31-C

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, HAZARDS),
(BEAMS(ELECTROMAGNETIC), LASERS), LIGHT
TRANSMISSION, SAFETY, EYE, DAMAGE,
PROBABILITY (U)

THE APPLICATION OF THE PROBABILITY OF DAMAGE
PARAMETER FOR BOUNDED WAVES WITH NON-HOMOGENEOUS WAVE
FRONTS IS DISCUSSED. THE FIRST APPROACH TREATS THE
BEAM PROFILE AS A SERIES OF QUASI-HOMOGENEOUS ENERGY
DENSITY REGIONS. THE SECOND APPROACH CONSISTS OF A
GENERALIZED ANALYSIS APPLIED TO BEAMS FOR WHICH AN
ANALYTICAL FORM OF THE PROFILE IS KNOWN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ

683 924 6/10 20/5
ARMY ENVIRONMENTAL HYGIENE AGENCY EDGEWOOD ARSENAL MD
THE EVALUATION OF LASER HAZARDS. (U)
68 10P SLINNEY, DAVID H. ; PALMISANO,
WILLIAM A. I

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN AMERICAN INDUSTRIAL
HYGIENE ASSOCIATION JNL., V29 P425-431. SEP-OCT
68.

SUPPLEMENTARY NOTE: PRESENTED AT AMERICAN INDUSTRIAL
HYGIENE CONFERENCE, CHICAGO, ILL., MAY 67.

DESCRIPTORS: (LASERS, HAZARDS), EXPOSURE,
SAFETY, EYE, LIGHT, INTENSITY,
THRESHOLDS (PHYSIOLOGY), SENSITIVITY,
EYEGLASSES, DENSITY, PROTECTION, TABLES (U)

RECENT DEVELOPMENTS IN LASER TECHNOLOGY HAVE
PRODUCED GREATER ENERGY AND POWER OUTPUTS IN AN EVER-
INCREASING VARIETY OF LASERS OF DIFFERING
WAVELENGTHS. A VARIETY OF HAZARDS EXIST TO
INDIVIDUALS WORKING AT OR IN THE VICINITY OF LASER
OPERATIONS. A PROGRAM OF HAZARD EVALUATION AND
CONTROL HAS BEEN CONDUCTED BY THE AUTHORS IN A
VARIETY OF LASER INSTALLATIONS. THE PRINCIPAL
HAZARDS OF LASER RADIATION TO THE EYE DUE TO BOTH
DIRECT AND REFLECTED VIEWING ARE DISCUSSED.
CRITERIA ARE GIVEN FOR DETERMINING THE HAZARDS OF A
GIVEN LASER BY EVALUATING THE EFFECTS OF THE LASER
OUTPUT CHARACTERISTICS (POWER OR ENERGY OUTPUT,
WAVELENGTH, EMERGENT BEAM DIAMETER AND DIVERGENCE)
AND THE EFFECTS OF VARIOUS ENVIRONMENTAL FACTORS
(OUTPUT OR LABORATORY SETTING, AMBIENT LIGHTING,
ETC). METHODS OF MEASURING OR CALCULATING THE
LIGHT INTENSITY AT A GIVEN POINT AND GUIDELINES FOR
CONTROL OF HAZARDS ARE GIVEN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD#685 872 6/16 20/5
MEDICAL COLL OF VIRGINIA RICHMOND HEALTH SCIENCES DIV
BIOLOGICAL APPLICATIONS AND EFFECTS OF OPTICAL
MASERS, (U)
APR 69 24P AM, WILLIAM T. , JR. ;
CLARKE, ALEXANDER M. ; CLEARY, STEPHEN F. ;
MUELLER, HAROLD A. ; GEERAETS, WALTER J. ;
CONTRACT: DA-49-193-MD-2241
MONITOR: USAMRDC 1968-6

UNCLASSIFIED REPORT

DESCRIPTORS: (*EYE, BURNS), (*LASERS,
HAZARUS), SOUND, RADIOMETERS, CALIBRATION,
MATHEMATICAL MODELS, RETINA, VISION (U)

THE BIOLOGICAL EFFECTS OF Q-SWITCHED, GATED AND
NORMAL PULSE TRAIN MODE ND AND RUBY LASERS, AND
CW ARGON AND HE-NE LASERS ARE DISCUSSED,
TOGETHER WITH THE EQUIPMENT USED TO PRODUCE THESE
EFFECTS. INDUCED SONIC TRANSIENT PHENOMENA,
RETINAL THERMAL DAMAGE THRESHOLD VALUES, AND VISUAL
DECREMENT AS A RESULT OF OPTICAL IRRADIATION ARE
SHOWN. A BIBLIOGRAPHY OF RECENT PUBLICATIONS IN
RELATED AREAS IS INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ/

AD 686 247 6/3 6/5
GEORGE WASHINGTON UNIV WASHINGTON D C DEPT OF
OPHTHALMOLOGY
OCULAR HAZARDS OF TRANSSCLERAL LASER RADIATION.
II. INTRAOCULAR INJURY PRODUCED BY RUBY AND
NEODYMIUM LASERS.
67 12P SMITH, RICHARD S. ; STEIN,
MARVIN N. I
CONTRACT: DA-49-193-MD-2680
PROJ: DA-3-A-D14501-B-71-P

(U)

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN AMERICAN JNL. OF
OPHTHALMOLOGY. V67 N1 P100-110 JAN 69.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH ALBANY
MEDICAL CENTER. N. Y. SEE ALSO AD-674 249.

DESCRIPTORS: (*LASERS, RADIATION HAZARDS),
(*EYE, RADIATION INJURIES), LABORATORY ANIMALS,
CORNEA, RETINA, TEST METHODS, RUBY, NEODYMIUM,
WOUNDS + INJURIES, OPHTHALMOLOGY

(U)

THE OCULAR EFFECTS OF TRANSSCLERAL RADIATION BY
NON-Q-SWITCHED RUBY AND NEODYMIUM LASERS WERE
STUDIED IN LIVING RABBITS. IN A NUMBER OF RABBIT
EYES, POSTERIOR SUBCAPSULAR CATARACTS OF A
CHARACTERISTIC CONFIGURATION WERE PRODUCED. DOSAGE
RELATED CHORIORETINAL DESTRUCTION DEVELOPED BENEATH
THE SITE OF IMPACT ACCOMPANIED BY VITREOUS
COAGULATION, HEMORRHAGE, AND SECONDARY RETINAL
DETACHMENT. NO CONTRA-COUP LESIONS WERE OBSERVED.
VARIOUS SECONDARY CHANGES INVOLVING THE ANTERIOR
SEGMENT OCCURRED FOLLOWING THE INITIAL INJURY. THE
CHANGES OBSERVED FOLLOWING TRANSSCLERAL LASER
RADIATION ARE SIGNIFICANT BECAUSE OF THE INCREASING
USE OF HIGH ENERGY LASER DEVICES IN RESEARCH
LABORATORIES AND INDUSTRY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ/

AD-686 506 13/12
NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE
LASER SAFETY. (U)
APR 69 39P LEWIN, NEAL A. ;
CONTRACT: N00039-68-C-3579
PROJ: SETE 210/100; XF-013-17-01
TASK: 599

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, SAFETY), EDUCATION,
PERSONNEL, EYE, EYEGLASSES, MEDICAL EXAMINATION,
LENSES, PATHOLOGY, LABORATORIES, DESIGN,
PROTECTION, HAZARDS (U)

A DESCRIPTION OF THE POTENTIALLY DELETERIOUS
EFFECTS OF LASERS ON OPERATING PERSONNEL IS
PRESENTED. SAFETY EDUCATION AND EQUIPMENT ARE
DESCRIBED ALONG WITH RECOMMENDATIONS FOR THE SAFE
OPERATION OF LASER FACILITIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-688 181 6/5
LOUISVILLE UNIV KY DEPT OF OPHTHALMOLOGY
STUDY OF OCULAR EFFECTS OF CHRONIC EXPOSURE TO LASER
RADIATION. (U)
DESCRIPTIVE NOTE: ANNUAL REPT. NO. 1, 1 APR-31 DEC 68,
FEB 69 28P LAWILL, THEODORE ; REESE,
EUGENE P. ; SHARP, FRANK M. ; COX, WILLIAM E. ;

CONTRACT: DADA17-68-C-8105

UNCLASSIFIED REPORT

DESCRIPTORS: (EYE, LASERS), (LASERS,
HAZARDS), BURNS, RETINA, EXPOSURE, RABBITS,
MODELS(SIMULATIONS), SAFETY, STANDARDS,
ELECTRORETINOGRAPHY, OPHTHALMOLOGY, RESPONSES,
PATHOLOGY (U)

DEVELOPMENT OF A MODEL WAS INITIATED TO COMPARE
RETINAL DAMAGE CAUSED BY CHRONIC EXPOSURE TO C.W.
LASER RADIATION AND THAT CAUSED BY CONVENTIONAL
ILLUMINATION. THE PURPOSE OF THE COMPARISON IS TO
ESTABLISH SAFETY STANDARDS FOR C.W. LASERS. THE
EXPERIMENTAL ANIMAL USED SO FAR HAS BEEN THE RABBIT.
IT WAS DISCOVERED THAT THE RABBIT EYE IS MUCH MORE
RESISTANT TO THIS KIND OF DAMAGE THAN ANIMALS
PREVIOUSLY TESTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 742227

AJ-688 626 6/5 20/5
TEXAS UNIV HOUSTON GRADUATE SCHOOL OF BIOMEDICAL
SCIENCES
THE EFFECTS OF LASER RADIATION ON RECEPTOR FUNCTION
IN HUMAN AND PRIMATE EYES; (U)
APR 69 26P SPERLING, M. G. HARWORTH,
R. S. IMBRY, J. H. ILANDIS, D. J. ;
REPT. NO. UT-GSBS-DADA-2
CONTRACT: DADA17-67-C-7154

UNCLASSIFIED REPORT

DESCRIPTORS: (EYE, LASERS), (LASERS,
HAZARDS), FLASHBLINDNESS, RETINA, SENSITIVITY,
PATHOLOGY, LIGHT, THRESHOLDS (PHYSIOLOGY),
INTENSITY, PRIMATES (U)

IN A SERIES OF EXPERIMENTS, THE EFFECTS OF INTENSE
SPECTRAL BANDS HAVING THE CHARACTERISTICS OF RUBY AND
ARGON LASER LIGHT HAVE BEEN MEASURED IN RHESUS MONKEY
EYES. RESULTS OBTAINED BY MEASURING SPECTRAL
SENSITIVITY IN THEIR PRESENCE - OR IMMEDIATELY AFTER
THESE EXPOSURES - DEMAND A TWO-STAGE (RECEPTOR
STAGE, NEURAL OPPONENT STAGE) EXPLANATION OF
SPECTRAL SENSITIVITY FOR THE HIGHLY LIGHT ADAPTED
EYE. IN CONTINUING STUDIES, THESE MEASURES ARE
BEING CARRIED OVER THE ENTIRE RANGE UP TO INTENSITIES
OF LASER LIGHT WHICH WILL PRODUCE GROSS THERMAL
INJURY. IT IS PLANNED TO RELATE CHANGES IN VISUAL
SENSITIVITY TO ULTRASTRUCTURAL CHANGES IN THE RETINA.
TECHNIQUES FOR ULTRASTRUCTURAL STUDY OF THE
VERTEBRATE RETINA ARE BRIEFLY DISCUSSED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-688 871 6/5 20/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
SKIN LESION THRESHOLD VALUES FOR LASER RADIATION AS
COMPARED WITH SAFETY STANDARDS. (U)
DESCRIPTIVE NOTE: FINAL REPT.,
FEB 69 16P PARR,WORDIE H. ;
REPT. NO. USAM7L-813
PROJ: DA-3-A-061102-B-71-R
TASK: 3-A-061102-B-71-R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, BURNS), (SKIN,
THRESHOLDS(PHYSIOLOGY)), EXPOSURE, SAFETY,
THERMAL RADIATION, GAS LASERS, DOSAGE,
PROTECTION (U)
IDENTIFIERS: RUBY LASERS (U)

THE LARGE AMOUNT OF SKIN SURFACE MAKES THIS BODY
TISSUE READILY AVAILABLE TO ACCIDENTAL AND REPEATED
EXPOSURES OF LASER RADIATION, AND MOST LASER SAFETY
PROGRAMS INCLUDE MINIMAL RADIATION LEVELS FOR SKIN
EXPOSURE. HOWEVER, THE VALUES SUGGESTED ARE
GENERALLY THOSE CONSIDERED NON-HAZARDOUS UNDER WORST
CASE CONDITIONS AND ARE NOT BASED ON EXPERIMENTAL
EVIDENCE. THIS REPORT BRIEFLY SUMMARIZES THE FEW
STUDIES FOUND IN THE OPEN LITERATURE THAT MIGHT BE
CONSIDERED PERTINENT TOWARDS ESTABLISHING ACCEPTABLE
ACUTE LASER RADIATION LEVELS FOR SKIN. THE
THRESHOLD LESION VALUES GIVEN FOR BOTH HUMAN AND
ANIMAL SKIN ARE DISCUSSED AND COMPARED WITH GUIDELINE
VALUES SUGGESTED FOR SAFE EXPOSURE LEVELS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-689 483 6/5 20/5
EG AND G INC LOS ANGELES CALIF SANTA MONICA D.V.
HELIUM NEON LASER EFFECTS ON THE EYE. (U)
DESCRIPTIVE NOTE: ANNUAL REPT. 1 AUG 68-31 MAR 69,
APR 69 64P DAVIS, THOMAS P. MAUTNER,
WILLIAM J. I
REPT. NO. EG-G-C106-59223
CONTRACT: DADA17-69-C-9013

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, EYE), (*GAS
LASERS, HAZARUS), (*EYE, WOUNDS + INJURIES),
RADIATION EFFECTS, RETINA, HELIUM, NEON,
EXPOSURE, BURNS, DOSAGE, RESPONSES, SAFETY (U)
IDENTIFIERS: HELIUM NEON LASERS (U)

THE OBJECTIVE OF THIS PROGRAM WAS AN INVESTIGATION
OF THE EFFECTS OF HELIUM-NEON LASER RADIATION ON THE
EYE. ALL EXPOSURES WERE OF 10 SECOND DURATION, AND
THE OPHTHALMOSCOPICALLY VISIBLE RETINAL LESION WAS
SELECTED AS THE INJURY CRITERION. MEDIAN EFFECTIVE
POWERS WERE ESTABLISHED FOR RETINAL EXPOSURE SPOT
DIAMETERS OF 100, 260, AND 600 MICROMETERS. INJURY
WAS ASSESSED IMMEDIATELY, AND AT 10 MINUTES, 1 HOUR,
AND 1 DAY POST-EXPOSURE. AN ANALYTICAL PREDICTION
OF THE RELATIONSHIP BETWEEN MEDIAN EFFECTIVE POWER
AND SPOT SIZE WAS ALSO TESTED. THE SENSITIVITY
RATIO WAS NOT CONSTANT, BUT DEPENDED ON SPOT SIZE.
MEDIAN EFFECTIVE POWERS INCREASED WITH INCREASING
SPOT SIZE, AS EXPECTED, BUT THE INCREASE WAS NOT AS
GREAT AS THAT PREDICTED ANALYTICALLY. IT WAS
CONCLUDED THAT A THOROUGH STUDY OF THE ANALYTICAL
PREDICTION OF INJURY IS NEEDED TO RESOLVE THIS
DISCREPANCY. THE NEED FOR A DAMAGE CRITERION BASED
ON FUNCTIONAL INJURY WAS ALSO RECOGNIZED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-692 846 6/19 20/5
ARMY MEDICAL RESEARCH LAB FORT KNOX KY
THE RETINAL PIGMENT EPITHELIUM. V. RADIATION
THRESHOLDS ASSOCIATED WITH THE Q-SWITCHED RUBY
LASER. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 69 15P LEIBOWITZ, HOWARD M. ;
PEACOCK, GEORGE R. FRIEDMAN, EPHRAIM ;
REPT. NO. USAMRL-823
PROJ: DA-3-A-061102-B-71-R
TASK: 3-A-061102-B-71-R-01

UNCLASSIFIED REPORT

DESCRIPTORS: (•COHERENT RADIATION, RETINA),
(•RETINA, HAZARDS), LASERS, BURNS,
THRESHOLDS (PHYSIOLOGY), HISTOLOGICAL TECHNIQUES,
MONKEYS (U)

IDENTIFIERS: Q SWITCHED LASERS, RUBY LASERS,
•RETINAL INJURIES (U)

THE MACULA LUTEA OF ANESTHETIZED RHESUS MONKEYS
WERE EXPOSED TO GRADED AMOUNTS OF LIGHT EMITTED BY A
Q-SWITCHED RUBY LASER IN ORDER TO DETERMINE THE
RADIATION THRESHOLD FOR RETINAL INJURY. THE EYES
WERE STUDIED OPHTHALMOSCOPICALLY AND BY MEANS OF FLAT
PREPARATIONS OF THE RETINAL PIGMENT EPITHELIUM.
OPHTHALMOSCOPICALLY VISIBLE LESIONS WERE OBSERVED
AT RETINAL ENERGY DENSITIES OF 0.07 J/SQ CM AND
ABOVE. HISTOLOGIC LESIONS OF THE RETINAL PIGMENT
EPITHELIUM WERE NOTED AT RETINAL ENERGY DENSITY
LEVELS AS LOW AS 0.01 J/SQ CM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-694 478 6/3 20/5
COLORADO UNIV BOULDER DEPT OF ELECTRICAL ENGINEERING
APPLICATION OF LASERS TO EMBRYOLOGY. (U)
DESCRIPTIVE NOTE: SCIENTIFIC REPT. 1 AUG 64-31 JUL 65.
JUL 65 16P BARNES, FRANK S. ;
CONTRACT: DA-49-193-MD-2652

UNCLASSIFIED REPORT

DESCRIPTORS: (*EMBRYOLOGY, *LASERS), MITOSIS,
EMBRYOS, DEFORMATION, RADIATION EFFECTS, GROWTH,
CELLS(BIOLOGY), EFFECTIVENESS,
THRESHOLUS(PHYSIOLOGY), DEOXYRIBONUCLEIC ACIDS,
IMAGES, QUANTUM MECHANICS, PERTURBATION THEORY,
COHERENT RADIATION

IDENTIFIERS: Q SWITCHING

(U)

(U)

STUDIES WERE MADE IN THE FOLLOWING AREAS OF
ACTIVITY: (1) EMBRYOLOGY, (2) AN
UNDERSTANDING OF THE KIND OF CHEMICAL REACTIONS WHICH
MAY BE TAKING PLACE, (3) THE NATURE OF COHERENT
LIGHT AS APPLIED TO IMAGE FORMING SYSTEMS, (4)
THE DEVELOPMENT OF A U. V. LASER, (5) THE
DEVELOPMENT OF THE THEORY OF Q-SWITCHING AND
(6) INITIAL MEASUREMENTS ON THE EXISTENCE OF
SHOCK WAVES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-696 447 6/18

HONEYWELL INC ST PAUL MINN RESEARCH DEPT
LASER RADIATION EFFECTS ON THE MORPHOLOGY AND
FUNCTION OF OCULAR TISSUE.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 AUG 68-31 JUL 69,

AUG 69 37P JONES, ARTHUR E. 1

SPYROPOULOS, PERRY IMASSOF, ROBERT W. 1

REPT. NO. 12047-FRI

CONTRACT: DADA17-67-C-0019

UNCLASSIFIED REPORT

DESCRIPTORS: (•RADIATION EFFECTS, LASERS),
(•LASERS, EYE), TISSUES(BIOLOGY),
MORPHOLOGY(BIOLOGY), VISION, RETINA,
ELECTRORETINOGRAPHY, SENSITIVITY, EXPOSURE,
MONKEYS, BEHAVIOR, INTENSITY, RESPONSES,
BURNS, ELECTROPHYSIOLOGY

(U)

THE EFFECTS OF DIFFERENT ENERGY LEVELS OF RUBY
LASER RADIATION ON ELECTROPHYSIOLOGICAL,
PSYCHOPHYSICAL AND ANATOMICAL MEASURES WERE EXAMINED.
SPECTRAL SENSITIVITY TESTS, USING AN ERG
ANALYSIS, DEMONSTRATED PROLONGED LASER EFFECTS ON
RHESUS AND MANGABEY MONKEYS. AT 15-MONTHS POST-
EXPOSURE FOR THE RHESUS MONKEY (0.8J/SQ CM),
THE AMPLITUDE OF THE B WAVE WAS DEPRESSED AT ALL
WAVELENGTHS EXCEPT 420 NM. AT ONE-YEAR POST-LASER
EXPOSURE FOR THE MANGABEY MONKEY (0.2J/SQ CM),
THE AMPLITUDE OF THE B WAVE WAS DEPRESSED AT ALL
WAVELENGTHS AND THE AMPLITUDE OF THE B WAVE AS A
FUNCTION OF INTENSITY AT 570 NM WAS DEPRESSED BY
ABOUT 20 PERCENT AT HIGH INTENSITY AND NOT AFFECTED
AT LOW INTENSITY. ALSO, THE THIRD OSCILLATORY
POTENTIAL REMAINED ABSENT. AN ERG ANALYSIS OF
THE RAYLEIGH MATCH DEMONSTRATED THAT RHESUS MONKEYS
HAVE NORMAL COLOR VISION (A.Q. = 1.0), THAT
SQUIRREL MONKEYS ARE PROTANOMALOUS (A.Q. =
0.305), AND THAT OWL MONKEYS ARE MONOCHROMATIC
(A.Q. = INFINITY). FOLLOWING LASER EXPOSURE
OF TWO RHESUS MONKEYS THE MATCH WAS UNBALANCED IN
FAVOR OF THE GREEN COMPONENT, INDICATING A
PROTANOMALOUS RESPONSE. BEHAVIORAL STUDIES OF TWO
RHESUS MONKEYS, ONE LASER EXPOSED AT 1.8J/SQ CM AND
ONE EXPOSED AT 0.18J/SQ CM, DEMONSTRATED A
REDUCTION IN SENSITIVITY AT ALL BUT TWO SPECTRAL
POINTS FOR THE MONKEY EXPOSED AT 1.8J/SQ CM AND NO
SIGNIFICANT CHANGE IN THE SENSITIVITY OF THE MONKEY
EXPOSED AT 0.18J/SQ CM. THE LATTER MONKEY DID,
HOWEVER, SHOW A MARKED CHANGE IN THE SHAPE OF THE
FUNCTION INDICATING AN ANOMALOUS FINDING.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD#697 151 6/5 20/5
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
PROBABILITY ANALYSIS OF OCULAR DAMAGE DUE TO LASER
RADIATION THROUGH THE ATMOSPHERE. (U)
DESCRIPTIVE NOTE: MEMORANDUM REPT.,
SEP 69 38P DEITZ, PAUL H. I
REPT. NO. BRL-MR-2012
PROJ: RDT/E-1-T-061102-A-31-C

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIATION INJURIES, LASERS),
(*LASERS, MATHEMATICAL MODELS), (*EYE,
LASERS), SAFETY, ATMOSPHERIC MOTION,
ATTENUATION, NOMOGRAPHS, HAZARDS (U)

A MATHEMATICAL MODEL DEVELOPED WHICH PREDICTS
THE PROBABILITY OF OCULAR DAMAGE OCCURRING TO
PERSONNEL ILLUMINATED BY PULSED LASER BEAM AS A
FUNCTION OF THE APERTURE, OPTICAL AND ATMOSPHERIC
PARAMETERS. THE EQUATION INCLUDES TERMS FOR THE
LASER OUTPUT ENERGY, DIVERGENCE, AND ATMOSPHERIC
PARAMETERS OF ATTENUATION AND SCINTILLATION.
SAMPLE COMPUTATIONS ARE SHOWN, AND A SAFETY
NOMOGRAPH IS DEVELOPED TO FACILITATE THE EYE HAZARD
ANALYSIS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-697 837 6/16

COLLEGE DE FRANCE PARIS NATURALIA ET BIOLOGIA
EFFECT OF LASER MICRO-IRRADIATION ON ISOLATED
CELLS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. APR 68-JUL 69,
JUL 69 18P BESSIS, MARCEL ;

CONTRACT: DAJ37-68-C-0929

PROJ: DA-2-N-061102-B-71-D

MONITOR: ARDG(E) E-1316

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIATION EFFECTS,
*CELLS(BIOLOGY)), (*LASERS,
CELLS(BIOLOGY)), BLOOD CELLS, DAMAGE,
THERMAL RADIATION, MITOCHONDRIA, NECROSIS,
FRANCE

(U)

THE WORK DESCRIBED WAS CONCERNED PRINCIPALLY WITH
AN EXAMINATION OF THE EFFECTS PRODUCED BY LASER
IRRADIATION OF ISOLATED HUMAN BLOOD CELLS AND VARIOUS
TYPES OF CULTURED CELLS IN AN EFFORT TO STUDY:
(1) THE TYPES OF CELLULAR DAMAGE PRODUCED BY
DIFFERENT WAVELENGTHS, ENERGIES, AND TYPES OF LASER
EMISSION; (2) THE POSSIBILITY OF DESTRUCTION OF
SPECIFIC CELLULAR ORGANELLES, AND (3) THE
REACTION OF OTHER CELLS TO AN INDIVIDUAL CELL'S
DEATH. BY COMPARING THE THERMAL EFFECTS PRODUCED
BY LASER LIGHT IS STAINED CELLS WITH THOSE INDUCED IN
A STAINED MODEL SYSTEM (ALBUMIN), IT WAS FOUND
THAT IT IS POSSIBLE TO CALCULATE THE CONCENTRATION OF
THE STAIN IN MITOCHONDRIA. EVALUATION OF VARIOUS
PARAMETERS OF LASER IRRADIATION (PARTICULARLY
THERMAL EVENTS) HAS LED TO THE DETERMINATION OF THE
OPTIMAL IRRADIATION TIMES FOR BOTH THE MEASUREMENT OF
LOCAL STAIN CONCENTRATION AND THE SELECTIVE
DESTRUCTION OF *INFRA-STAINED* MITOCHONDRIA. THE
ULTRAVIOLET LASER HAS BEEN USED IN PRELIMINARY
EXPERIMENTS TO DEMONSTRATE, AT THE ULTRASTRUCTURAL
LEVEL, THAT THE MORPHOLOGICAL LESIONS PRODUCED IN
CHROMATIN ARE VERY DIFFERENT FROM THOSE OBSERVED
AFTER CONVENTIONAL UV IRRADIATION, I.E.,
COAGULATION RATHER THAN *PALING* IS INDUCED IN THE
TARGET AREA. (AUTHOR)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AU-699 383 6/18 6/13
PASADENA FOUNDATION FOR MEDICAL RESEARCH CALIF DEPT OF
LASER BIOLOGY
THE EFFECT OF LASER ENERGY ON CELLS IN TISSUE
CULTURE. (U)
DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT. NO. 2,
DEC 69 21P ROUNDS, DONALD E. I
CONTRACT: DA-49-193-MD-2564

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO ANNUAL SUMMARY REPT. NO. 1,
AD-680 946.

DESCRIPTORS: (*TISSUE CULTURE CELLS, *LASERS),
(*COHERENT RADIATION, *RADIATION EFFECTS),
ENERGY, CHROMOSOMES, GROWTH, DOSAGE, IN VITRO
ANALYSIS, BLOOD COAGULATION, INHIBITION, MITOSIS,
PATHOLOGY, LACTIC ACID, OXIDOREDUCTASES,
MORPHOLOGY(BIOLOGY), A. ENOS, NE PHOSPHATES,
PHOTOSENSITIVITY(BIOLOGICAL), LEUKOCYTES,
ULTRAVIOLET RADIATION (U)

LASER POWER AT 2650 A PRODUCED CYTOLYSIS AND
INHIBITION IN THE MIGRATION OF LEUKOCYTES. IT ALSO
INHIBITED THE ACTIVITY OF LACTIC DEHYDROGENASE, AND
PRODUCED A PHOTOPRODUCT OF URIDYLIC ACID WITH A
REVERSIBLE ABSORPTION CHANGE. INJURED CELLS SHOWED
A LOSS OF MITOTIC ACTIVITY AND AN INCREASED FREQUENCY
OF NUCLEAR ABNORMALITIES. THE FOCUSED ARGON
MICROBEAM PRODUCED VISIBLE LESIONS IN NUCLEOLI WHICH
SHOWED A REDUCED URIDINE INCORPORATION INTO RNA.
ABLATION OF THE NUCLEOLAR ORGANIZER SITES ON
CHROMOSOMES SHOWED A LOSS OF GENETIC FUNCTION IN
ORGANIZING A NUCLEOLUS. CONCENTRATIONS OF 0.0001
TO 0.01 M ADP COULD MIMIC THE PROMOTION OF BLOOD
CLOTTING RATES, PLATELET AGGLUTINATION, AND
INHIBITION OF CELL GROWTH, WHICH WERE PRODUCED BY
CHEMICALS THAT ARE RELEASED FROM RUBY LASER-
TRAUMATIZED CELLS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-700 124 6/18 20/5
FRANKFORD ARSENAL PHILADELPHIA PA
DETERMINATION OF VISIBLE THRESHOLD OF DAMAGE IN
RETINA OF RHESUS MONKEY BY Q-SWITCHED RUBY LASER. (U)
DESCRIPTIVE NOTE: MEMORANDUM REPT.,
OCT 69 17P LANDERS, MAURICE B. ;
BEATRICE, EDWIN S. ; BYER, HAROLD H. ; POWELL,
JAMES D. ; CHESTER, JACK E. ;
REPT. NO. FA-M69-26-1
PHOJ: DA-1-T-061102-A-31-C, DA-3-A-062110-A-
231

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIATION INJURIES, *LASERS),
(*RETINA, RADIATION INJURIES),
(*THRESHOLDS(PHYSIOLOGY), LASERS), MONKEYS,
DAMAGE, HISTOLOGY (U)
IDENTIFIERS: RUBY LASERS, Q-SWITCHED LASERS (U)

RUBY LASER THRESHOLD DAMAGE DATA HAVE BEEN
PREVIOUSLY REPORTED. RESULTS INDICATE AT LEAST ONE
ORDER OF MAGNITUDE DIFFERENCE IN REPORTED VALUES.
THIS PAPER REEVALUATES THE THRESHOLD DATA IN 20
EYES OF RHESUS MONKEYS FROM Q-SWITCHED RUBY LASER
EXPOSURES IN THE RANGE FROM ONE TO 100 MICROJOULES,
WITH RESULTS DESCRIBED IN TERMS OF TOTAL ENERGY
DELIVERED TO THE EYE. THE APPARATUS EMPLOYED
DIFFERED FROM THAT OF PREVIOUS INVESTIGATORS BY THE
USE OF A TEMOO MODE RUBY LASER IN PREFERENCE TO A
MULTIMODE LASER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-700 422 6/19 6/5 20/5
STANFORD RESEARCH INST MENLO PARK CALIF
RESEARCH ON OCULAR LASER THRESHOLDS. (U)
DESCRIPTIVE NOTE: FINAL REPT. 15 MAR 68-15 JUL 69.
AUG 69 86P VASSILIADIS, ARTHUR IROSAN,
ROBERT C. IZWENG, H. CRISTIAN ;
CONTRACT: F41609-68-C-0041
PROJ: SRI-7191

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, EYE), (*RETINA,
THRESHOLDS(PHYSIOLOGY)), (*EYE, BURNS),
HISTOLOGY, EXPOSURE, PATHOLOGY, TABLES,
MONKEYS, HAZARDS, OPHTHALMOLOGY, VISION, GAS
LASERS (U)
IDENTIFIERS: RUBY LASERS, ARGON LASERS, HELIUM
NEON LASERS, NEODYMIUM GLASS LASERS, *LASER
INJURIES (U)

RESULTS OF EXPERIMENTAL INVESTIGATIONS OF THRESHOLD
LEVELS FOR SMALL RETINAL LESIONS ARE PRESENTED.
DATA FOR RHESUS MONKEYS INCLUDE THRESHOLDS FOR A
Q-SWITCHED NEODYMIUM LASER, BOTH IN THE MACULA AND
IN THE PARAMACULAR AREA. IN ADDITION, EXTENSIVE
DATA ARE PRESENTED FOR ARGON, HELIUM-NEON, AND
NEODYMIUM-YAG LASER DAMAGE THRESHOLD. EXPOSURES
OF HUMAN VOLUNTEERS TO VARIOUS LASERS ARE REPORTED.
THE LASERS USED WERE Q-SWITCHED NEODYMIUM AND
RUBY LASERS, A LONG-PULSE RUBY LASER, AND AN ARGON
LASER. A REPORT ON THE HISTOPATHOLOGY OF RETINAL
INJURY IN RHESUS MONKEYS DUE TO Q-SWITCHED
NEODYMIUM AND ARGON LASERS IS INCLUDED.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-702 725 13/1 20/5
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA
XENON LAMPS. VOLUME I. (U)
DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY NOV 58-OCT 69.
MAR 70 102P
REPT. NO. DDC-TAS-70-23-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2. AD-866
860L.

DESCRIPTORS: (*XENON LAMPS, *BIBLIOGRAPHIES),
PUMPING(OPTICAL), ELECTRIC ARCS, GAS
IONIZATION, FLASH LAMPS, BEACONS, RUBY, LASERS,
EYE, MERCURY LAMPS, THERMIONIC CONVERTERS,
INFRARED RADIATION, PHOTONS, PHOTOTUBES,
TRANSISTORS, SOLAR RADIATION, MASS SPECTROSCOPY (U)
IDENTIFIERS: ANNOTATED BIBLIOGRAPHIES (U)

THE BIBLIOGRAPHY CONTAINS ANNOTATED REFERENCES
DEALING WITH ILLUMINANTS EQUIPPED WITH POWERFUL XENON
LAMPS, A SATELLITE-BORNE XENON FLASH OPTICAL BEACON
FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION,
DEVELOPMENT OF INFRARED SOURCES, OCULAR EFFECTS OF
THERMAL RADIATION, SPECTRAL FLASH LAMPS, AND OPTICAL
PUMPS FOR LASERS. ITS USE AS THERMAL ENERGY IS ALSO
DISCUSSED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-702 865 6/5 6/12 20/5
EYE RESEARCH FOUNDATION BETHESDA MD
MEASUREMENT OF RETINAL IMAGE FOR LASER RADIATION IN
RHESUS MONKEY. (U)
DESCRIPTIVE NOTE: FINAL REPT.,
FEB 70 37P STEIN, MARVIN N. ;ELGIN.
STEPHEN S. ;
REPT. NO. 7005-703F
CONTRACT: F41609-68-C-0038

UNCLASSIFIED REPORT

DESCRIPTORS: (•LASERS, HAZARDS), (•RETINA,
BURNS), MEASUREMENT, INTENSITY, IN VIVO
ANALYSIS, IN VITRO ANALYSIS, LIGHT, DESIGN,
MEDICAL EQUIPMENT, MONKEYS, IMAGES (U)

THE TECHNIQUES DESCRIBED WERE DEVELOPED TO
CORROBORATE THE FEASIBILITY OF MAKING IN VIVO
MEASUREMENTS OF IMAGE PARAMETERS IN THE INTERIOR OF
THE EYE. THE PRELIMINARY EXPERIMENTS ON EXCISED
EYES DEMONSTRATED THAT THE PROCEDURE FOR
PHOTOGRAPHING THE IMAGE WAS A RELIABLE AND VALID WAY
TO RECORD THE IMAGE FOR DETAILED EXAMINATION. THE
DESIGN OF A SUITABLE FIBER OPTICS CONDUIT POSED
SEVERAL DIFFICULT PROBLEMS. HOWEVER, IT WAS
DEMONSTRATED THAT THE DESIGN ACHIEVED DOES PROVIDE A
MEANS FOR TRANSMITTING THE INFORMATION DIRECTLY TO AN
EXTERNAL DETECTOR AND THAT THE RESOLUTION OF THE
SYSTEM CAN BE MADE SUFFICIENTLY HIGH TO PROVIDE THE
REQUIRED FIDELITY. THE RESULTS OF THE IN VITRO
EXPERIMENTS WITH EXCISED EYES INDICATE THAT 20 MICRON
DIAMETER AT INTENSITY VALUE OF 1/E OF MAXIMUM IS
PROBABLY THE LIMITING SIZE ONE CAN EXPECT TO FIND FOR
AN EMETROPIC, LIGHT ADAPTED RHESUS MONKEY EYE. THE
IN VIVO MEASUREMENTS DERIVED FROM A LIMITED NUMBER OF
SAMPLES RESULTED IN VALUES OF 32 MICRONS FOR A 2MM
PUPIL AND 37 MICRONS FOR A 4MM PUPIL. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-706 220 20/5
ATMOSPHERIC SCIENCES OFFICE WHITE SANDS MISSILE RANGE N
MEX
THE ERBIUM DOPED GLASS LASER-PERFORMANCE AND
ATMOSPHERIC PROPAGATION CHARACTERISTICS, (U)
MAR 70 27P WHITE, K. O. HOLT, E. H.
WOODCOCK, R. F. I
PROJ: DA-1-T-061102-B-53-A
TASK: 1-T-061102-B-53-A-19
MONITOR: ECOM 5294

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS,
PERFORMANCE(ENGINEERING)), (*ATMOSPHERE, LIGHT
TRANSMISSION), INFRARED RADIATION, SAFETY,
ERBIUM, LASERS (U)
IDENTIFIERS: *ERBIUM LASERS, EMISSION SPECTRA,
NEAR INFRARED RADIATION (U)

THE TECHNOLOGICAL STATUS OF THE ERBIUM LASER IS
DESCRIBED. WHEN A GLASS BASE IS USED, THIS LASER
EMITS ENERGY IN THE NEIGHBORHOOD OF 1.54 MICROMETERS,
WHICH IS IN THE SO-CALLED EYE-SAFE REGION OF THE
SPECTRUM. IT HAS BEEN FOUND THAT A CLOSE-COUPLED
ARRANGEMENT OF THE LASER ROD AND A LINEAR FLASH LAMP
GIVES THE LOWEST PUMP THRESHOLD ENERGY. THE
EMISSION CHARACTERISTICS OF THE ERBIUM LASER WHICH
USES A PHOSPHATE GLASS BASE HAVE BEEN DETERMINED.
FACTORS AFFECTING THE TRANSMISSION OF ENERGY OF
THIS WAVELENGTH IN THE ATMOSPHERE ARE DISCUSSED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-707 871 6/19
WASHINGTON STATE UNIV PULLMAN
BEHAVIORAL ASSESSMENT OF VISUAL FUNCTIONING
IMMEDIATELY AFTER EXPOSURE OF THE EYE TO A LASER. (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.)
MAY 70 22P GRAHAM, ERNEST S. ; FARNER,
DONALD N. ; MARK, ROGER G. ; FIELDS, THOMAS A.
;
CONTRACT: F29600-69-C-0007
PROJ: AF-6893, AF-6301
MONITOR: 6571-ARL TR-70-9

UNCLASSIFIED REPORT

DESCRIPTORS: (*RETINA, BURNS), (*LASERS,
HAZARDS), EYE, EXPOSURE,
STRESS(PHYSIOLOGY), PHYSIOLOGY, VISUAL ACUITY,
FLASHBLINDNESS, PATHOLOGY, VISION (U)
IDENTIFIERS: *LASER INJURIES (U)

A BEHAVIORAL PROGRAM IS DESCRIBED WHICH PERMITS
ASSESSMENT OF VISUAL FUNCTIONING IN RHESUS MONKEYS
IMMEDIATELY FOLLOWING LASER- INDUCED FOVEAL
IMPAIRMENT. SIX RHESUS MONKEYS WERE TRAINED ON A
VISUAL DISCRIMINATION PROBLEM INVOLVING LANDOLT
RINGS. SUBJECTS RECEIVED STIMULI VIA VIEWING TUBES
TO EITHER THE RIGHT OR LEFT EYE ON A RANDOM BASIS.
AN EQUAL NUMBER OF STIMULI WERE PRESENTED TO EACH
EYE. MIDWAY THROUGH THE BEHAVIORAL PROGRAM THE
RIGHT EYE WAS EXPOSED TO A NEODYMIUM LASER. POST-
EXPOSURE BEHAVIORAL TESTING BEGAN IMMEDIATELY
THEREAFTER. THE BEHAVIORAL DATA PREDICTED THE
OCCURRENCE OF FOVEAL IMPAIRMENT AS VERIFIED BY FUNDUS
PHOTOGRAPHS TAKEN APPROXIMATELY 1 HOUR AFTER
EXPOSURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-709 685 6/5 20/5
TEXAS UNIV HOUSTON GRADUATE SCHOOL OF BIOMEDICAL
SCIENCES
THE EFFECTS OF LASER RADIATION ON RECEPTOR FUNCTION
IN HUMAN AND PRIMATE EYES. (U)
DESCRIPTIVE NOTE: ANNUAL PROGRESS REPT. NO. 3, 1 JUN 69-
1 APR 70,
MAY 70 47P SPERLING, HARRY G. IHARWERTH,
RONALD S. IHARRY, JOHN H. IJOHNSON, CLEMENT I

REPT. NO. UT-GSBS-DADA-3
CONTRACT: DADA17-67-C-7154

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-688 626.

DESCRIPTORS: (EYE, LASERS), (LASERS,
HAZARDS), (RETINA, BURNS), FLASHBLINDNESS,
MONKEYS, COHERENT RADIATION, MICROSTRUCTURE,
PATHOLOGY (U)
IDENTIFIERS: LASER INJURIES (U)

IN A SERIES OF EXPERIMENTS, THE EFFECTS OF INTENSE
SPECTRAL BANDS HAVING THE CHARACTERISTICS OF RUBY AND
ARGON LASER LIGHT WERE MEASURED IN RHESUS MONKEY
EYES. RESULTS OBTAINED BY MEASURING SPECTRAL
SENSITIVITY IN THEIR PRESENCE - OR IMMEDIATELY AFTER
THESE EXPOSURES - DEMAND A TWO-STAGE (RECEPTOR
STAGE, NEURAL OPPONENT STAGE) EXPLANATION OF
SPECTRAL SENSITIVITY FOR THE HIGHLY LIGHT ADAPTED
EYE. IN CONTINUING STUDIES, THESE MEASURES ARE
BEING CARRIED OVER THE ENTIRE RANGE UP TO INTENSITIES
OF LASER LIGHT WHICH WILL PRODUCE GROSS THERMAL
INJURY. IT IS PLANNED TO RELATE CHANGES IN VISUAL
SENSITIVITY TO ULTRASTRUCTURAL CHANGES IN THE RETINA.
THE TECHNIQUES FOR ULTRASTRUCTURAL STUDY OF THE
VERTEBRATE RETINA ARE BRIEFLY DISCUSSED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ/

AD-710 406 6/5
PENNSYLVANIA UNIV PHILADELPHIA SCHOOL OF MEDICINE
HISTOPATHOLOGY OF ARGON LASER-INDUCED RETINAL
LESIONS. (U)
DESCRIPTIVE NOTE: ANNUAL PROGRESS REPT. NO. 1. 1 AUG 69-
31 JUL 70.
AUG 70 10P YANOFF, MYRON I
CONTRACT: DADA17-70-C-0011

UNCLASSIFIED REPORT

DESCRIPTORS: (*RETINA, *BURNS), (*LASERS,
BURNS), EYE, LABORATORY ANIMALS, PATHOLOGY,
HISTOLOGY, DAMAGE, OPHTHALMOLOGY, ARGON (U)

THE PURPOSE OF THIS PROJECT WAS TO OBTAIN
INFORMATION ON THE BIOLOGIC EFFECTS OF THE ARGON
LASER ON THE RETINA. AFTER OWL AND RHESUS MONKEYS
WERE EXPOSED TO A CONTINUOUS WAVE ARGON LASER THE
EYES WERE EVALUATED. SERIAL SECTIONS WERE CUT WITH
A MICROTOME THROUGH THE SUSPICIOUS RETINAL AREAS IN
ORDER TO DETERMINE THE PRESENCE OR ABSENCE OF RETINAL
DAMAGE. BOTH METHODS--THE SERIAL SECTIONS OF THE
SUSPICIOUS RETINAL LESIONS AND THE FLAT-MOUNT RETINAL
PIGMENT EPITHELIAL PREPARATIONS--GAVE VERY
SATISFACTORY INFORMATION ON 'THRESHOLD' ARGON LASER
RETINAL LESIONS. THE FLAT-MOUNT PREPARATIONS,
HOWEVER, PROVED TO BE THE QUICKEST AND MOST USEFUL
METHOD. BOTH METHODS ENABLED US TO SHOW THAT THE
HISTOPATHOLOGY CORRELATED EXCELLENTLY WITH THE
CLINICALLY SEEN RETINAL LESIONS. THE FLAT-MOUNT
PREPARATIONS PROVED TO BE SLIGHTLY MORE SENSITIVE
THAN OPHTHALMOSCOPIC OBSERVATIONS IN IDENTIFYING
'THRESHOLD' RETINAL LESIONS. THE PIGMENT EPITHELIUM
WAS THE MOST SENSITIVE AREA OF THE RETINA EXPOSED TO
'THRESHOLD' ARGON LASER ENERGIES. THE
PHOTORECEPTOR AND OUTER NUCLEAR LAYERS WERE THE NEXT
MOST SENSITIVE RETINAL AREAS. THE INNER LAYERS OF
THE RETINA SEEMED TO BE RELATIVELY UNAFFECTED BY THE
ARGON LASER AT 'THRESHOLD' ENERGIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-711 412 6/18 20/5

FRANKFORD ARSENAL PHILADELPHIA PA
OCULAR HAZARDS OF THE Q-SWITCHED ERBIUM
LASER.

(U)

DESCRIPTIVE NOTE: TECHNICAL RESEARCH ARTICLE,
MAR 70 10P LUND, DAVID J. LANDERS,
MAURICE B. IBRESNICK, GEORGE H. POWELL, JAMES
O. CHESTER, JACK E. I

REPT. NO. FA-A70-5

PROJ: DA-1-T-061102-A-31-C

TASK: -1-T-061102-A-31-C-06

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN INVESTIGATIVE OPHTHALMOLOGY,
ST. LOUIS, V9 N6 P463-470 JUN 70.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 6 JAN
78.

DESCRIPTORS: (RADIATION HAZARDS, LASERS),
(EYE, LASERS), RADIATION INJURIES, RADIATION
EFFECTS, RADIOLOGICAL DOSAGE, PATHOLOGY,
HISTOLOGY, NECROSIS, THRESHOLDS (PHYSIOLOGY),
EXPERIMENTAL DATA, MONKEYS, CORNEA
IDENTIFIERS: ERBIUM LASERS

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THE THRESHOLD FOR OCULAR DAMAGE WAS DETERMINED IN
OWL MONKEYS WITH THE USE OF A Q-SWITCHED ERBIUM-
GLASS LASER AT 1.64 MICRONS CONSTRUCTED IN THE
LABORATORY. OCULAR DAMAGE WAS LIMITED TO THE CORNEA
AND CHARACTERIZED BY LOCALIZED OPACIFICATION OF THE
EPITHELIUM AND STROMA. ALL EXPOSURES TO ENERGY
DENSITIES GREATER THAN 30 J./SQ CM PRODUCED INJURY.
THE MEDIAN LEVEL FOR DAMAGE OCCURRED AT 21 J./SQ
CM, AND NO INJURY COULD BE DETECTED BELOW 17 J./SQ
CM. COMPARISON WITH THRESHOLD VALUES FOR OCULAR
DAMAGE BY Q-SWITCHED LASERS OPERATING IN THE
VISIBLE AND NEAR VISIBLE PORTION OF THE SPECTRUM
SHOWS THAT THE ERBIUM LASER OFFERS PROMISE AS A
RELATIVELY 'SAFE LASER.' (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ/

AD-712 96U 6/5

ARMY MEDICAL RESEARCH LAB FORT KNOX KY
ANALYSIS OF LASER INDUCED SKIN BURNS BY A DAMAGE
INTEGRAL MODEL. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,

MAR 70 18P BROWNELL, ARNOLD S. MYSELL,

DAVID K. ;

REPT. NO. USAMRL-662

PROJ: DA-3-A-061102-B-71-P

TASK: 3-A-061102-B-71-P-02

UNCLASSIFIED REPORT

DESCRIPTORS: (*BURNS, *LASERS),

THRESHOLDS(PHYSIOLOGY),

TOLERANCES(PHYSIOLOGY), EXPOSURE, SKIN, HEAT

TOLERANCE, MATHEMATICAL MODELS, PREDICTIONS (U)

AN ANALYSIS OF EXPERIMENTAL DATA DEFINING THE
THRESHOLD VALUES OF IRRADIANCE AS A FUNCTION OF
EXPOSURE TIME TO CO2 LASER RADIATION TO INDUCE
UNIFORM FULL THICKNESS EPITHELIAL BURNS DEMONSTRATED
THAT WITHIN THE EXPOSURE TIME RANGE OF 0.2 TO 5 SEC
THE DATA ARE ACCURATELY DESCRIBED BY THE DAMAGE
INTEGRAL MODEL. FOR TIMES IN EXCESS OF 5 SEC THE
VALUES PREDICTED BY THE MODEL WERE HIGHER THAN THOSE
DETERMINED EXPERIMENTALLY. THE VALIDITY OF THE
TIME-TEMPERATURE RELATIONS IN THE EPIDERMIS PREDICTED
BY THE OPAQUE SEMI-INFINITE THERMAL MODEL AND THE
THERMAL CONSTANTS FOR PORCINE SKIN NEED TO BE
DETERMINED NO THE MODEL AND CONSTANTS MODIFIED IF
NECESSARY. ADDITIONAL EXPERIMENTS TO DETERMINE
DAMAGE THRESHOLDS AT VARIOUS DEPTHS ARE NEEDED TO
EXTEND THE USE OF THE MODEL IN PREDICTING MORE LEVELS
OF DAMAGE. SUCH EXPERIMENTS WOULD ALSO PERMIT
FURTHER EVALUATION OF SOME OF THE ASSUMPTIONS
INHERENT IN THE MODEL. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-713 359 6/5
NORTHEASTERN UNIV BOSTON MASS DEPT OF BIOPHYSICS AND
BIOMEDICAL ENGINEERING
ANTERIOR CHAMBER MEASUREMENTS ON CO2 LASER CORNEAL
IRRADIATION. (U)
FEB 70 7P MACKEN, D. IFINE, S. I
FEIGEN, L. IFINE, B. S. I
CONTRACT: DA-49-193-MD-2436, DA-49-193-MD-2437

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN INVESTIGATIVE
OPHTHALMOLOGY, V9 N5 P366-371 MAY 70.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY GRANTS PHS-
EY-00397 AND NGR-22-011-007. PREPARED IN COOPERATION
WITH GEORGE WASHINGTON UNIV. WASHINGTON, D. C.
DEPT. OF OPHTHALMOLOGY. REVISION OF REPORT DATED 29
SEP 69.

DESCRIPTORS: (CORNEA, LASERS), (GAS LASERS,
RADIATION EFFECTS), EYE, OPHTHALMOLOGY,
PROTEINS, PRESSURE, BODY FLUIDS, HEAT,
THRESHOLDS (PHYSIOLOGY), TEMPERATURE (U)
IDENTIFIERS: CARBON DIOXIDE LASERS (U)

AT THRESHOLD IRRADIATION (0.1 W./SQ CM) OF THE
RABBIT CORNEA WITH A CARBON DIOXIDE (CO2) LASER,
THERE WAS NO DETECTABLE RISE IN INTRAOCULAR PRESSURE
AND ONLY A SLIGHT (1 TO 2C.) RISE IN AQUEOUS
TEMPERATURE. ON SUPRATHRESHOLD CO2 CORNEAL
IRRADIATION, THE INTRAOCULAR PRESSURE ROSE TO A
PLATEAU DURING IRRADIATION AND THEN GRADUALLY FELL.
THERE WAS A CONCOMITANT RISE IN TEMPERATURE IN THE
ANTERIOR CHAMBER CAUSED BY HEAT CONDUCTION FROM THE
SITE OF CORNEAL IRRADIATION. FURTHER RISE IN THE
TEMPERATURE OF THE CORNEAL STROMA TO THE CRITICAL
TEMPERATURE RANGE FOR HEAT SHRINKAGE OF COLLAGEN
CAUSES THE CORNEA TO THICKEN. THIS THICKENING OF
THE CORNEA HELPS TO BRING HEATED AQUEOUS UNDER THE
IRRADIATED SITE MORE CLOSELY IN APPPOSITION TO THE
LENS AND IRIS. THUS FURTHER INCREASING THE
TEMPERATURE OF THE ANTERIOR LENS. LENS INDENTATION
WAS OBSERVED IN FIXED EYES ONLY FOLLOWING PULSES OF
SUFFICIENT POWER AND DURATION TO RAISE THE
TEMPERATURE NEAR THE SURFACE OF THE ANTERIOR LENS TO
A RANGE OF AT LEAST 60 TO 70C. INCREASE IN
AQUEOUS PROTEIN OCCURRED ONLY WITH IRRADIATION OVER
REGIONS OF THE IRIS DIAPHRAGM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ/

AD-713 511 6/5
FRANKFORD ARSENAL PHILADELPHIA PA
RETINAL DAMAGE BY Q-SWITCHED RUBY LASER, (U)
70 15P BEATRICE, EDWIN S. ILANDERS,
M. B. ; POWELL, J. O. IBRESNICK, G. H. I

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: JOINT AMRDC-AMC LASER SAFETY
TEAM.

DESCRIPTORS: (*RADIATION INJURIES, LASERS),
(*RETINA, BURNS), (*LASERS, HAZARDS), EYE,
DAMAGE, RADIATION EFFECTS, TISSUES(BIOLOGY),
THRESHOLDS(PHYSIOLOGY), OPHTHALMOLOGY,
EXPERIMENTAL DATA, PATHOLOGY, HISTOLOGY, VISUAL
INSPECTION (U)
IDENTIFIERS: *Q SWITCHED LASERS, *RUBY LASERS (U)

IN STUDIES OF RETINAL DAMAGE BY THE Q-SWITCHED
RUBY LASER, THRESHOLD VALUES WERE DETERMINED FOR BOTH
'MINIMAL' AND LARGE RETINAL SPOT SIZES. IN ADDITION
TO USING THE CONVENTIONAL OPHTHALMOSCOPIC METHODS FOR
DETECTING INJURY IN THE LIVING ANIMAL,
HISTOPATHOLOGICAL EXAMINATIONS WERE PERFORMED ON A
NUMBER OF IRRADIATED EYES FOLLOWING ENUCLEATION.
THE MICROSCOPIC EVALUATION OF IRRADIATED TISSUE WAS
CONSIDERED TO BE PARTICULARLY IMPORTANT IN THE
MINIMAL RETINAL SPOT SIZE EXPERIMENTS IN ORDER TO
SUPPORT THE OPHTHALMOSCOPIC OBSERVATIONS OF VERY
SMALL RETINAL LESIONS. IN ANALYZING THE DATA THE
MACULAR AND EXTRAMACULAR EXPOSURE SITES HAVE BEEN
CONSIDERED SEPARATELY BECAUSE OF CONFLICTING REPORTS
CONCERNING THE RELATIVE SENSITIVITY OF THESE TWO
RETINAL AREAS TO LASER DAMAGE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-713 831 6/16 6/5

SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
CELL MIGRATION AND PROLIFERATION DURING REPAIR OF
SUPERFICIAL CORNEAL WOUNDS PRODUCED BY A CARBON
DIOXIDE LASER. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL-31 AUG 69,
JUL 70 47P LEHMILLER, DAVID J. ;

REPT. NO. SAM-TR-70-29

PROJ: AF-6301

TASK: 630105

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, HAZARDS), (*WOUNDS +
INJURIES, *HEALING), (*CORNEA, *RADIATION
INJURIES), (*OPHTHALMOLOGY, RADIATION INJURIES),
EYE, TISSUES(BIOLOGY), CELLS(BIOLOGY),
HISTOLOGY, BIOSYNTHESIS, DESOXYRIBONUCLEIC ACIDS,
PHYSIOLOGY, EXPERIMENTAL DATA, TABLES, RABBITS,
GROWTH (U)

IDENTIFIERS: *LASER BURNS (U)

SUPERFICIAL WOUNDS WERE PRODUCED IN THE RABBIT
CORNEAL EPITHELIUM BY A 2-MM. CIRCULAR BEAM FROM A
CARBON DIOXIDE LASER. THE HEALING RESPONSE OF THE
EPITHELIUM WAS EXAMINED HISTOLOGICALLY IN TRITIATED
THYMIDINE RADIOAUTOGRAPHS AT VARIOUS TIMES FOLLOWING
WOUNDING. PROLIFERATION ACTIVITY AND CELL
POPULATION PER UNIT LENGTH WERE RECORDED IN THE BASAL
CELL LAYER PROCEEDING OUTWARD FROM THE WOUND CENTER.
PROFILES OF THE BASAL CELL MIGRATION, DENSITY, AND
PROLIFERATIVE PATTERN WERE GRAPHICALLY CONSTRUCTED
FROM AVERAGED NUMERICAL TABULATIONS OF INDIVIDUAL
WOUNDS. THE OBSERVED RATES OF BASAL CELL SYNTHESIS
OF DNA WERE FOUND TO BE MUCH HIGHER IN AREAS WHERE
ACTIVE MIGRATORY REPOPULATION OF THE WOUND SITE WAS
OCCURRING THAN IN UNDISTURBED EPITHELIUM. THESE
FINDINGS ARE CONTRARY TO RESULTS OF OTHER
INVESTIGATORS WHO HAVE STUDIED HEALING RESPONSES IN
DEEPER CORNEAL WOUNDS. THE DIFFERENCE IS
ATTRIBUTED TO PRESERVATION OF THE EPITHELIAL BASEMENT
LAMINA IN THE SUPERFICIAL WOUNDS. THE
PROLIFERATIVE PATTERNS FOUND WERE CHARACTERIZED BY
ONE OR MORE PRONOUNCED PEAKS OF ACTIVITY, AND THESE
WERE RELATED TO DEPRESSIONS IN THE BASAL CELL
POPULATION DENSITY RESULTING FROM RAPID CELL
MIGRATION INTO THE WOUND AREA. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-713 903 6/16

SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
RELATIVE SENSITIVITY OF VARIOUS AREAS OF THE
RETINA TO LASER RADIATION. (U)

DESCRIPTIVE NOTE: REPT. FOR JAN 69-JAN 70,
JAN 70 7P LAPPIN, PAUL W. COUGAN,

PHILIP S. I

REPT. NO. SAM-TR-7U-264

PROJ: AF-6301

TASK: 630105

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN ARCHIVES OF OPHTHALMOLOGY,
V84 P350-354 SEP 70.

DESCRIPTORS: (+RETINA, LASERS), (+RADIATION
HAZARDS, RETINA), EYE,
THRESHOLDS(PHYSIOLOGY), RADIOLOGICAL DOSAGE,
RADIATION INJURIES, SENSITIVITY, OPTIC NERVE,
OPHTHALMOLOGY, TISSUES(BIOLOGY),
CELLS(BIOLOGY), ORGANIC PIGMENTS (U)

THRESHOLD DAMAGE DOSES FOR HELIUM-NEON (HENE)
LASER RADIATION WERE DETERMINED IN 20 RHESUS MONKEY
EYES AT SEVEN SELECTED SITES, RANGING FROM 50 DEGREES
NASAL TO 30 DEGREES TEMPORAL TO THE MACULA. THE
MEAN DAMAGE THRESHOLD AT THE MACULA WAS FOUND TO BE
LOWEST OF ALL EXAMINED SITES, WHILE THE AREA BETWEEN
THE OPTIC DISC AND THE MACULA WAS HIGHEST.
PLANIMETRY MEASUREMENTS OF THE RETINAL STRUCTURES
ON AN EXCISED EYE SHOWED THE COMPARATIVE THICKNESS OF
THE NERVE FIBER LAYER SITES. THIS LAYER WAS FOUND
TO BE THICKEST AT THE AREAS LEAST SENSITIVE TO LASER
IRRADIATION, SUGGESTING THAT THE OPTIC NERVE FIBERS
ACT AS AN ATTENUATING MEDIUM. THE HIGH SENSITIVITY
OF THE MACULA IS ATTRIBUTED CHIEFLY TO THE HIGH
DENSITY OF PIGMENT GRANULES IN THE MACULAR PIGMENT
EPITHELIAL CELLS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZZZ

AD*714 835 6/5

MEDICAL COLL OF VIRGINIA RICHMOND
THE EFFECT OF THRESHOLD MACULAR LESIONS AND
SUB-THRESHOLD MACULAR EXPOSURES ON VISUAL
ACUITY IN THE RHESUS MONKEY. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

MAY 69 28P FARRER, D. N. GRAHAM, E.

S. HAM, W. T. JR. GEERAETS, W. J.:

WILLIAMS, R. C. I

CONTRACT: DASA49-146-XZ-416

PROJ: DASA-NWER-MB-137, DASA-NWER-MB-002

MONITOR: DASA 2326-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*RETINA, *BURNS),
THRESHOLDS(PHYSIOLOGY), EYE, VISUAL ACUITY,
LASERS, SOLAR RADIATION, NUCLEAR RADIATION,
ENERGY, OPHTHALMOLOGY, MONKEYS (U)

THE PURPOSE OF THIS RESEARCH PROGRAM WAS TO
EVALUATE RETINAL THRESHOLD BURNS AND SUBTHRESHOLD
EXPOSURES OF THE MAMMALIAN MACULA IN TERMS OF VISUAL
ACUITY. RHESUS MONKEYS (MACACA MULATTA) WERE
TRAINED BY A REWARD SYSTEM TO RESPOND TO THE
AUTOMATED PRESENTATION OF LANDOLT RINGS, ACCORDING
TO THE METHOD OF GRAHAM, MCVEAN, AND FARRER.
AFTER APPROPRIATE TRAINING, THESE ANIMALS WERE
EXPOSED TO THRESHOLD AND SUB-THRESHOLD LEVELS OF
RETINAL ENERGY DENSITY RANGING FROM 3.2 TO 10.7 J/
SQ CM. EXPOSURE TIME APPROXIMATELY 135 MS, SPECTRAL
QUALITY APPROXIMATELY THAT OF COLOR TEMPERATURE
8000K WITH WAVELENGTHS ABOVE 400 NM REMOVED, AND
IMAGE SIZES ON THE RETINA OF ABOUT 1 MM DIAMETER,
COVERING A MAJOR PORTION OF THE MONKEY MACULAR AREA.
RESULTS, IN TERMS OF VISUAL ACUITY DECREMENT
(MONOCULAR), INDICATED THAT ENERGY DENSITIES ON
THE RETINA BELOW 5 J/SQ CM. WERE NOT STATISTICALLY
SIGNIFICANT, WHEREAS DENSITIES GREATER THAN 5
J/SQ CM PRODUCED LOSSES IN VISUAL ACUITY
(MONOCULAR) WHICH WERE SIGNIFICANT. THESE
RESULTS INDICATE THAT AT LEVELS OF ENERGY DENSITY ON
THE RETINA WHICH ARE 80 TO 50 PERCENT BELOW THE
THRESHOLD BURN LEVEL, NO LOSS IN VISUAL ACUITY CAN BE
DETECTED IN THE RHESUS MONKEY BY THE LANDOLT RING
TESTING SYSTEM ADOPTED FOR THIS INVESTIGATION.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZZZZZ

AD-715 210 6/18

SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
RETINAL DAMAGE FROM REPEATED SUBTHRESHOLD
EXPOSURES USING A RUBY LASER
PHOTOCOAGULATOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT. APR-MAY 70.

OCT 70 15P GIBSON, GURDON L. M. ;

REPT. NO. SAM-TR-70-59

PROJ: AF-6301

TASK: 630105

UNCLASSIFIED REPORT

DESCRIPTORS: (*RETINA, BURNS), (*LASERS,
HAZARDS), EYE, RADIATION EFFECTS, SUBLETHAL
DOSAGE, RADIOLOGICAL DOSAGE,
THRESHOLDS (PHYSIOLOGY), MONKEYS

(U)

A RUBY LASER PHOTOCOAGULATOR WAS USED TO DELIVER
SINGLE AND MULTIPLE SUBTHRESHOLD EXPOSURES TO THE
RETINA OF MACACA MULATTA. THE SUBEXPOSURES
PARAMETERS WERE 0.5-MSEC. PULSE, 1.3-MM.-DIAMETER
FOCAL SPOT, AND ENERGY DENSITY OF ABOUT 375 MJ/SQ
CM. SINGLE EXPOSURES PRODUCED NO MICROSCOPIC
CHANGES ON SACRIFICE AT 1 TO 30 DAYS FOLLOWING
EXPOSURE. REPETITIVE EXPOSURES (7 TO 17
EXPOSURES) AT THE SAME ENERGY LEVEL INVARIABLY
CAUSED CHARACTERISTIC DAMAGE IN THE OUTER RETINAL
LAYERS. THESE CUMULATIVE EFFECTS ARE SIMILAR TO AND
MORE WIDESPREAD THAN THE MINIMAL-DAMAGE LESIONS
PRODUCED BY SINGLE SUPRATHRESHOLD EXPOSURES USING
HIGHER ENERGY DENSITY (900 TO 1000 MJ/SQ CM).
CURRENT SAFETY CRITERIA ARE BASED ON THE ASSUMPTION
THAT LASER DAMAGE OCCURS ON AN ALL-OR-NONE BASIS SO
THAT DAMAGE IS NOT CUMULATIVE IF A SINGLE EXPOSURE
CAUSES NO VISIBLE LESION. THIS WORK INDICATES THAT
SINGLE SUBTHRESHOLD EXPOSURES WHICH ARE LESS THAN
HALF OF A THRESHOLD DOSE ARE CUMULATIVE AND THEREFORE
EACH 'SUBTHRESHOLD' EXPOSURE MUST DAMAGE OR IN SOME
MANNER INCREASE THE RETINAL SUSCEPTIBILITY TO
SUBSEQUENT EXPOSURES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD# 17 166 6/3 6/18

TEXAS UNIV AUSTIN ELECTRONICS RESEARCH CENTER
EVOKED POTENTIALS FROM THE LASER-IRRADIATED
RETINA.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

MAR 70 168P HEMPEL, FRANKLIN G. WELCH,

ASHLEY J. I

REPT. NO. TR-83

CONTRACT: DAAB07-68-C-0319, AF-AFOSR-1792-69

PROJ: AF-4751

MONITOR: AFOSR 70-1872TR

UNCLASSIFIED REPORT

DESCRIPTORS: (*RETINA, COAGULATION), (*LASERS,
HAZARDS), ELECTRORETINOGRAPHY, RESPONSES,
RABBITS, SURGICAL TECHNIQUES, CEREBRAL CORTEX,
WOUNDS + INJURIES, OSCILLOSCOPES, RUBY

(U)

IDENTIFIERS: PHOTOCOAGULATION, LATERAL GENICULATE
BODY, LASER BURNS

(U)

THE DOCUMENT IS CONCERNED WITH THE EFFECT OF
RETINAL PHOTOCOAGULATION ON THE LIGHT EVOKED
ELECTRICAL RESPONSES OF THE VISUAL SYSTEM.
RESEARCH WAS CONDUCTED TO EXAMINE THE
ELECTRORETINOGRAM (ERG) AND THE LATERAL GENICULATE
NUCLEUS (LGN) AND STRIATE CORTEX POTENTIALS OF THE
RABBIT BEFORE AND AFTER IRRADIATION OF THE RETINA
WITH A HIGH-ENERGY RUBY LASER. PROTOCOL CONSISTED
OF RECORDING THE THREE POTENTIALS WHILE STIMULATING
THE EYE WITH AN ARGON LASER OPERATED AT SEVERAL FLASH
INTENSITIES, EXPOSING THE RETINA TO A CALCULATED RUBY
LASER RADIATION DOSAGE, AND RECORDING AGAIN THE
RESPONSES TO PHOTIC STIMULATION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD#718 610 17/8 20/5 6/18
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD
LASER RANGEFINDERS. (U)
DESCRIPTIVE NOTE: MATERIEL TEST PROCEDURE.
FEB 68 JSP
REPT. NO. MTP-A-3-165

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *RANGE FINDING),
(*COHERENT RADIATION, RADIATION HAZARDS), GAS
LASERS, TEST METHODS, PERFORMANCE(ENGINEERING),
RELIABILITY(ELECTRONICS), MOBILITY, ACCURACY,
VULNERABILITY, MAINTAINABILITY, RADIATION EFFECTS,
RADIOBIOLOGY, IRASERS, EYE, MILITARY
REQUIREMENTS (U)
IDENTIFIERS: LASER RANGE FINDERS (U)

THE PURPOSE IS TO PRESCRIBE THE GENERAL TEST
PROCEDURES TO BE USED TO DETERMINE, UNDER ACTUAL
FIELD OPERATING CONDITIONS, THE DEGREE TO WHICH LASER
RANGEFINDERS MEET THE MILITARY REQUIREMENTS STATED IN
THE QUALITATIVE MATERIEL REQUIREMENTS AND THE
TECHNICAL CHARACTERISTICS. INCLUDED IS A SAFETY
EVALUATION ON LASER RADIATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ?

AD#718 621 20/5 14/2
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD
LASERS. (U)
DESCRIPTIVE NOTE: MATERIAL TEST PROCEDURE.
NOV 68 26P
REPT. NO. MTP-6-2-165

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, TEST METHODS),
RELIABILITY, SAFETY, MAINTAINABILITY (U)
IDENTIFIERS: *COMMON ENGINEERING TEST
PROCEDURES (U)

THE OBJECTIVE OF THE PROCEDURE IS TO DESCRIBE A
PROCEDURE FOR DETERMINING AND EVALUATING THE
TECHNICAL PERFORMANCE CHARACTERISTICS OF LASERS AND
THEIR ASSOCIATED EQUIPMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-719 208 6/17 14/2
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD

LASER SAFETY GOGGLES. (U)

DESCRIPTIVE NOTE: MATERIEL TEST PROCEDURE.

DEC 68 42P

REPT. NO. MTP-10-2-198

UNCLASSIFIED REPORT

DESCRIPTORS: (•EYEGLASSES, TEST METHODS),
(•LASERS, SAFETY), OPTICAL PROPERTIES,
PROTECTION (U)

IDENTIFIERS: •COMMODITY ENGINEERING TEST PROCEDURES,
LASER SAFETY GOGGLES, •GOGGLES (U)

THE OBJECTIVE OF THE DOCUMENT IS TO PRESCRIBE THE
GENERAL TEST PROCEDURES TO BE USED TO DETERMINE THE
DEGREE TO WHICH LASER SAFETY GOGGLES MEET MILITARY
REQUIREMENTS FOR TECHNICAL PERFORMANCE AND SAFETY
CHARACTERISTICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZ7

AD-720 579 17/5 14/2
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD
LASER RANGEFINDERS. (U)
DESCRIPTIVE NOTE: MATERIEL TEST PROCEDURE.
OCT 69 19P
REPT. NO. MTP-A-2-166

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPERSEDES INTERIM PAMPHLET JS-
64.

DESCRIPTORS: (•RANGE FINDING, LASERS), (•TEST
METHODS, DISTANCE-MEASURING EQUIPMENT),
ELECTROMAGNETIC COMPATIBILITY, ENVIRONMENTAL TESTS,
RELIABILITY, SAFETY (U)
IDENTIFIERS: •COMMODITY ENGINEERING TEST PROCEDURES, (U)
•LASER RANGEFINDERS

THE OBJECTIVE OF THE PROCEDURE IS TO EVALUATE THE
PERFORMANCE AND SAFETY CHARACTERISTICS OF LASER
RANGEFINDERS UNDER A VARIETY OF EXPECTED OPERATING
CONDITONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-721 DBB 13/12 20/5 6/18
NAVAL TRAINING DEVICE CENTER ORLANDO FLA
LASER SAFETY.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 70 43P MOHON, WINDELL NEIL ;
REPT. NO. NAVTRADEVCEM-1H-181
PROJ: NAVTRADEVCEM-7881-17, NAVTRADEVCEM-7881-41

UNCLASSIFIED REPORT

DESCRIPTORS: (LASERS, SAFETY), X RAYS,
RADIATION INJURIES, RADIATION EFFECTS, SKIN,
EYE, MASERS, THRESHOLDS (PHYSIOLOGY)

(U)

A LITERATURE SURVEY OF THE MOST RECENT LASER SAFETY
PARAMETERS AND PRECAUTIONS IS PRESENTED. RECENT
LASER SAFETY LEGISLATION IS DISCUSSED. THE BASIC
FEATURES OF A LASER ARE DISCUSSED. RECOMMENDED
SAFE EXPOSURE LEVELS ARE GIVEN FOR THE EYE AND SKIN.
MODELS ARE DISCUSSED FOR THE EYE AND SKIN.
DAMAGE THRESHOLDS ARE LISTED FOR THE EYE AND SKIN.
FORMULAS ARE DERIVED FOR CALCULATING LASER
RADIATION EXPOSURE LEVELS. HAZARDS ASSOCIATED WITH
LASER OPERATION ARE DISCUSSED AND RECOMMENDATIONS ARE
MADE. THE CONTENTS FOR A BASIC LASER SAFETY
PROGRAM ARE PRESENTED. THIS PROGRAM INCLUDES THE
BASIC OPHTHALMOLOGIC AND DERMATOLOGIC TESTS WHICH
SHOULD BE GIVEN TO PERSONNEL. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZZZ

AD-722 970 6/16

DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA
RADIATION INJURIES AND SICKNESS. VOLUME
1.

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY MAY 57-JUL 70. (U)

MAY 71 262P

RZPT. NO. DDC-TAS-71-14-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-515 480.

DESCRIPTORS: (•RADIATION INJURIES,
•BIBLIOGRAPHIES), (•RADIATION SICKNESS,
BIBLIOGRAPHIES), WHOLE BODY IRRADIATION,
RADIATION EFFECTS, RADIOPROTECTIVE AGENTS,
RADIOBIOLOGY, RADIOLOGICAL CONTAMINATION, LASERS,
ANATOMY, IONIZATION, IMMUNITY, LIFE SUPPORT,
FOOD, NUCLEAR WARFARE CASUALTIES, LABELED
SUBSTANCES, ANTIBIOTICS, THERMAL RADIATION,
TOXICITY, PHARMACOLOGY

IDENTIFIERS: NUCLEAR DETONATIONS

(U)

(U)

THE ANNOTATED REFERENCES WERE COMPILED FROM THE
DEFENSE DOCUMENTATION CENTER'S DATA BANK ON
INJURIES AND SICKNESSES CAUSED BY RADIATION AND
RADIOACTIVE DECAYS. INDEXES OF CORPORATE AUTHOR-
MONITORING AGENCY, SUBJECT, AND TITLE ARE PROVIDED IN
THIS BIBLIOGRAPHY. (AUTHOR)

(U)

UNCLASSIFIED

CORPORATE AUTHOR - MONITORING AGENCY

*ADVISORY GROUP FOR AEROSPACE RESEARCH
AND DEVELOPMENT PARIS (FRANCE)

AGARD-CP-11

LOSS OF VISION FROM HIGH
INTENSITY LIGHT,
AD-652 917

*AERONEDICAL RESEARCH LAB (6871ST)
HOLLAND AFB N MEX

6871-ARL-TR-70-9

BEHAVIORAL ASSESSMENT OF VISUAL
FUNCTIONING IMMEDIATELY AFTER
EXPOSURE OF THE EYE TO A LASER,
AD-707 871

*AIR FORCE OFFICE OF SCIENTIFIC
RESEARCH ARLINGTON VA

AFOSR-70-1072TR

EVOCKED POTENTIALS FROM THE
LASER-IRRADIATED RETINA,
AD-717 160

*AIR PROVING GROUND CENTER EGILIN AFB
FLA

APCC-TR-68-52

HUMAN FACTORS/BIO MEDICAL SAFETY
CONSIDERATIONS FOR NEODYMIUM
LASERS,
AD-671 997

*ARMED FORCES INST OF PATHOLOGY
WASHINGTON D C

ANATOMIC AND HISTOCHEMICAL
CHANGES IN SKIN AFTER LASER
IRRADIATION,
AD-612 441

CENTRAL NERVOUS SYSTEM EFFECTS
OF LASER RADIATION,
AD-612 442

TPM-2: EFFECTS OF LASER
IRRADIATION ON THE SKIN,
AD-629 962

SOME EFFECTS OF NEODYMIUM LASER

RADIATION UPON THE HEADS OF DOGS,
AD-648 204

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•ARMY RESEARCH AND DEVELOPMENT GROUP
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•BALLISTIC RESEARCH LABS ABERDEEN
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•BUREAU OF MEDICINE AND SURGERY
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•NAVMEH-MR009.04.0014-7
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•DEFENSE DOCUMENTATION CENTER
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•HONEYWELL INC ST PAUL MINN RESEARCH
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•MEDICAL COLL OF VIRGINIA RICHMOND
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• NAVAL MEDICAL RESEARCH INST BETHESDA
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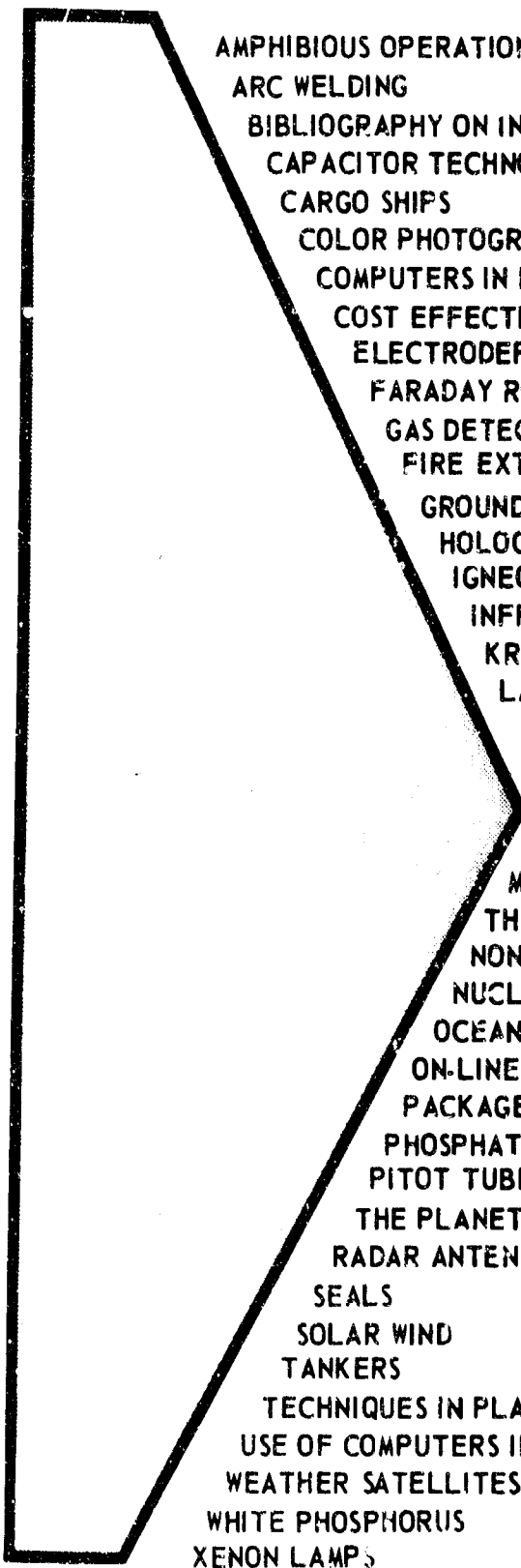
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